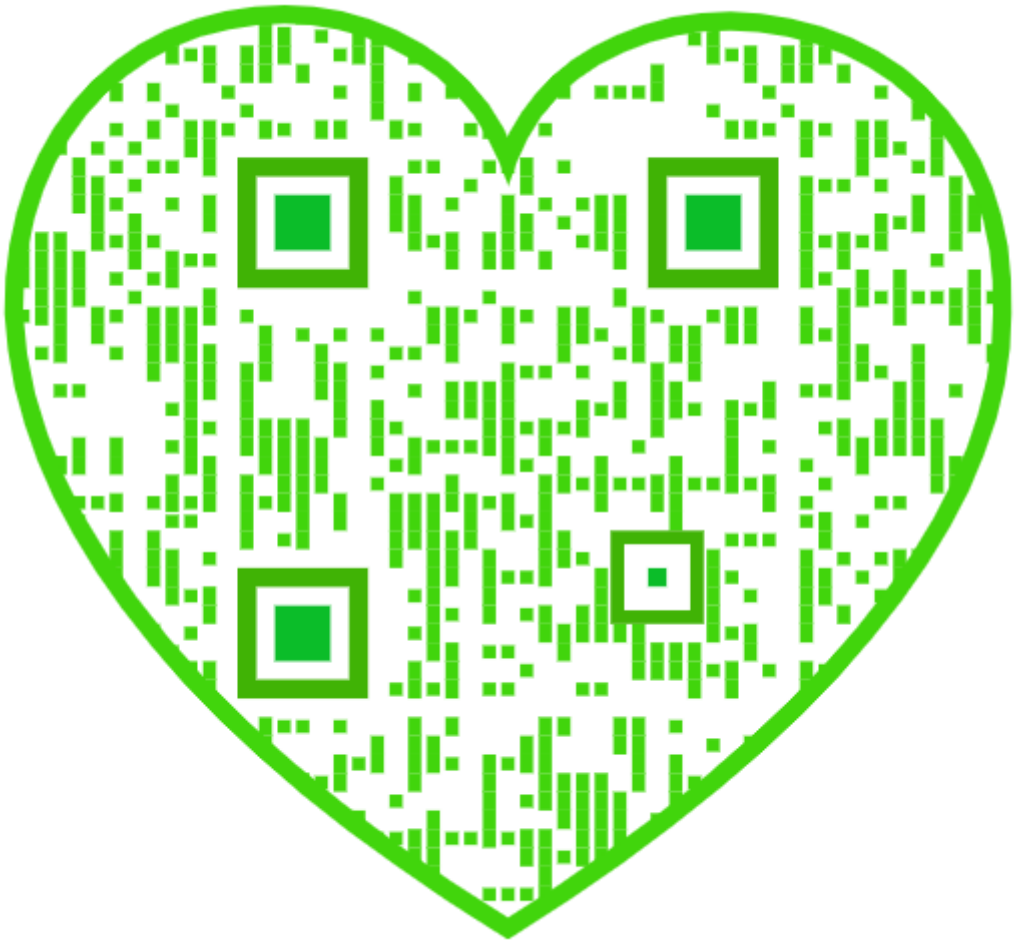

The Normal Course in Number

THE NEW
ELEMENTARY ARITHMETIC

BY

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SUGGESTIONS.

IT has been said that the "new education" proceeds to give the child an experience, instead of presupposing one for him. Pupils become practical, not by learning forms of reasoning, but by exercising the reason upon their own plane of comprehension.

In such a spirit this ELEMENTARY ARITHMETIC has been prepared. It presents three years' work, based upon carefully graded exercises, which may be used as a means of training pupils to think, and of teaching at the same time the practical application of numbers to ordinary business transactions.

The first and hardest step in solving an arithmetical question is to determine the processes required; the second, to state the different steps of the solution in proper arithmetical form.

It is very important that children should master the fundamental processes so thoroughly that they come to serve thought without loss of time or energy. The patient following of these graded exercises and drills should secure this result. The tables of "Endings," in addition (see pages 58, 61, etc.), have the same practical use as the multiplication table, and should be as thoroughly applied.

Each chapter presents, in general, division and multiplication as converse processes, followed by subtraction and addition on the same general plan. In the beginning each number is viewed as a whole, divisible into equal parts, and the parts are viewed in relation to the whole and to each other.

No formula should be taught with the thought that it will do the thinking for the pupil. Let the problem be pictured, and this followed by the expression in figures, before any formal expression in words is attempted. *Give a very thorough drill, as on page* 13, *Article* 2, before pupils are required to find these relations in concrete problems.

The object of picturing problems is not to teach children to make pictures (though all this work should be done with reasonable care), but to give a method of representation by which they

8 4 9 3 4

can make their thoughts clear to themselves. It is a means, not an end, and should be so regarded. When problems can be stated clearly and solved correctly there is no further necessity for picture representation, except as a means of testing the pupil's comprehension of spoken or written forms. Let not objective work be underrated, however. It is a very necessary means, which, rightly used, will secure an accurate knowledge and use of terms, and save much time and confusion later on. Pupils should learn early to show objectively the difference between six and one-*sixth* of six, between one-sixth of *six* and one-sixth of *one*, etc.

Two-step and three-step problems, which may be worked out orally in the recitation, will often be found too difficult for a written test. The indiscriminate use of "miscellaneous problems" may do much harm.

All *measures* introduced should be learned by actual use (see page 65). The standards in common use, such as the *yard, foot, ounce, pound, quart*, etc., can be obtained easily, and should form a part of the regular school supplies. Exercises in estimating volume and extension train the judgment while giving practical results in knowledge, and there is no time in the course when pupils can better afford to do this work.

Having worked Part I. to learn *what* and *how*, a profitable review can be made, directing chief attention to *why*. Rules should be made by the pupils after the process is learned from which the rule is derived.

Long Division is one of the difficult processes for children. At first they are unable to judge how many times the divisor is contained in the dividend or partial dividend. When about to commence Long Division much mental practice should be given with small numbers, 13, 14, 15, 16, etc., — such drill as 13 in 14, 13 in 15, 13 in 16, etc., to 13 in 117; same drill with 14, 15, 16, etc.

For additional suggestions, see "New Advanced Arithmetic," page 51.

This book has grown from *experience*, and is offered to fellow-teachers as a thoroughly systematic work-book.

N. C.

INDIANAPOLIS, January, 1899.

PREFACE.

IT has seemed to the authors of the NORMAL COURSE IN NUMBER that there is room for another series of Arithmetics, notwithstanding the fact that there are many admirable books on the subject already in the field.

The ELEMENTARY ARITHMETIC is the result of the experience of a supervisor of primary schools in a leading American city. Finding it quite impossible to secure satisfactory results by the use of such elementary arithmetics as were available, she began the experiment of supplying supplementary material. An effort was made to prepare problems that should be in the highest degree practical, that should develop the subject systematically, and that should appeal constantly to the child's ability to think. The accumulations of several years have been carefully re-examined, re-arranged, and supplemented, and are now presented to the public for its candid consideration.

Not the least valuable feature of this book is the careful gradation of the examples, securing thereby a natural and logical development of number work. No space is occupied with the presentation of theory, — that side of the subject being left to the succeeding book. The first thoughts are *what* and *how*, — these so presented that the processes shall be easily comprehended and mastered. Subsequently, the *why* may be intelligently considered and readily understood.

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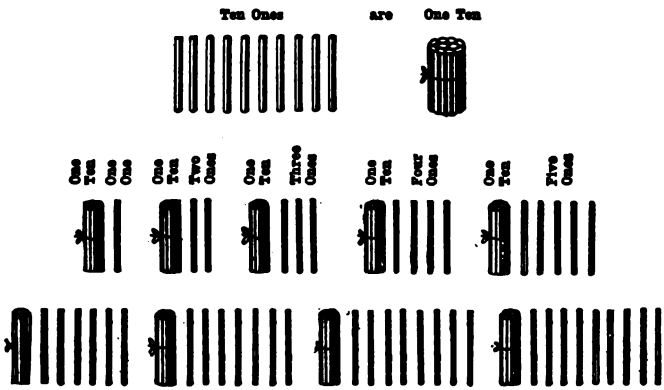
PART I.

CHAPTER I.

NUMBERS FROM TWENTY TO THIRTY.

1. Representing numbers by figures.



Place your bundles of counters upon your slates, or make drawings of these bundles of sticks, and

write under each the figure which stands for the *tens*, and the figure which stands for *ones*.

2. Read the number which you have written under each group.

In the first group (one *ten* and one *one*) the figures are alike; do they mean the same thing?

What does the figure on the left represent?

Which is more, one *one* or one *ten?*

Which is of more value, a one-cent piece or a ten-cent piece?

How many ones make one ten?

One *one* is what part of one *ten?*

3. Begin with 1, and write in a column the figures which stand for the numbers, through nineteen.

To the left of each write the *word* which stands for the number.

In the number *ten*, which figure stands for no *ones?*

Words: naught, one, two, three, four, five, six, seven, eight, nine.
Figures: 0 1 2 3 4 5 6 7 8 9

One Ten	One Ten and One	One Ten and Two	One Ten and Three
10	11	12	13
Ten	Eleven	Twelve	Thirteen

One Ten and Four	One Ten and Five	One Ten and Six
14	15	16
Fourteen	Fifteen	Sixteen

One Ten and Seven	One Ten and Eight	One Ten and Nine
17	18	19
Seventeen	Eighteen	Nineteen

4. One ten and two ones are how many ones?

Twelve ones are how many tens and ones?

Eighteen ones are how many tens and ones?

16 ones are how many tens and ones?

1 ten and 8 ones are how many ones?

5. Add one more to your nineteen sticks. How many tens have you?

How many ones besides the two tens?

Untie the bundles; how many ones have you?

Tie the two tens tightly together, place them on your slate, and write under this bundle the figure which stands for the two tens. To the right of the 2 place the figure which shows that there are no ones. Read the number ($\overset{\text{Twenty}}{20}$).

Two tens and no ones are twenty *ones*.

Read the number you have written, first as tens and ones.

Untie your bundles. How many ones?

Read the whole number of ones.

6. Take one more stick, and you have how many tens and ones?

Write the figure which stands for the two *tens;* the figure which stands for the one *one*.

Untie the bundles of sticks. How many ones have you?

Two *tens* and one *one* are twenty-one.

7. Read the number which you have written.

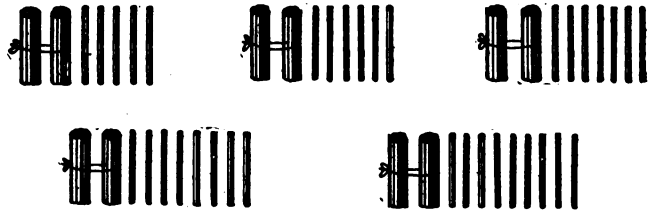
Take one more counter; how many tens and ones have you?

Write the figure which stands for the tens; the figure which stands for the ones.

Two tens and two are twenty-two. Write the figures for this number.

Write the figures for two *tens* and three *ones*.

Write the figures for two *tens* and four *ones*.



8. Draw these groups of tens and ones, and write under each group the figures which stand for tens and ones.

Two tens and five ones are how many ones?

Two tens and six ones are how many ones?

Two tens and eight ones?

Two tens and nine ones?

9. Take one more counter; add it to the twenty-nine. How many tens have you? Have you any ones besides the three tens?

Tie your three tens tightly together. Write the figures which stand for three *tens* and no *ones*.

Untie all the bundles. How many ones have you?

Three tens are how many ones? Thirty ones are how many tens?

10. Read these numbers: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30. Write them on your slate in a vertical column. To the left of each write the word which stands for the number.

In which line do you find all the ones? In which line are the tens?

29 ones are how many tens and ones? 2 tens and 6 ones are how many ones? Which is the greater, 2 tens or 2 ones?

11. The Roman letters, I, V, and X, are also used to represent numbers. I stands for one, V for five, and X for ten.

Words:	naught,	one,	two,	three,	four,	five,	six,	seven,	eight,	nine.
Figures:	0	1	2	3	4	5	6	7	8	9
Letters:		I	II	III	IV	V	VI	VII	VIII	IX

Ten	Eleven	Twelve	Thirteen	Fourteen	Fifteen	Sixteen
10	11	12	13	14	15	16
X	XI	XII	XIII	XIV	XV	XVI

Seventeen	Eighteen	Nineteen	Twenty	Twenty-one
17	18	19	20	21
XVII	XVIII	XIX	XX	XXI

Twenty-two	Twenty-three	Twenty-four	Twenty-five	Twenty-six
22	23	24	25	26
XXII	XXIII	XXIV	XXV	XXVI

Twenty-seven	Twenty-eight	Twenty-nine	Thirty
27	28	29	30
XXVII	XXVIII	XXIX	XXX

The Roman characters are not now employed in number work, but are chiefly used for numbering chapters and lessons, and occasionally for numbering some of the first pages in books, and in numbering appendixes and indexes. They are also used to indicate the different volumes of a series of books, and to mark the hours on the dials of clocks and watches.

These uses give variety, and sometimes prevent confusion. Since you will meet these characters in nearly every book you take up, it is well that you should know what they mean.

CHAPTER II.

1. Separate 21 cubes into three equal groups.

21 cubes are how many seven-cubes?

3 seven-cubes are how many cubes?

21 is how many 7's? 21 = 3 sevens.

21 ÷ 7 = 3 (21 contains 7 three times, or 21 contains 3 sevens).

3 sevens are how many? 3 sevens = 21.

3 times 7 are how many? 3 × 7 = 21.

7 is what part of 21? $\frac{1}{3}$ of 21 = ?

3 thirds of 21 are how many?

How many 7's can you take out of 21?

Begin with 21 and subtract 7's.

Begin with 7 and count 21 by 7's.

21 − 7 − 7 − 7 = ? 7 + 7 + 7 = ?

2. Copy the following forms, and place together those which have the same meaning.

Which show $\frac{1}{3}$ of 21? Which show that 21 contains 7 three times?

21 cubes ÷ 7 cubes = 3.
21 cubes ÷ 3 = 7 cubes.
21 oranges ÷ 3 = 7 oranges.
21 oranges ÷ 7 oranges = 3.

7 cubes) 21 cubes.
3, number of 7-cubes in 21 cubes

3) 21 cubes to be divided.
7 cubes.

21 miles ÷ 3 = 7 miles. 21 miles ÷ 7 miles = 3.
21 yards ÷ 3 = 7 yards. 21 yards ÷ 7 yards = 3.

3) 21 miles to be divided. 7 miles) 21 miles.
7 miles. 3, number of 7-miles in 21 miles.

3. Helen has 21 nuts which she wishes to share equally with two playmates. How many nuts will each receive?

Into how many equal groups must the nuts be divided? There are three children, so the nuts must be divided into three equal groups.

We count off one to each child in turn, until we have used all the nuts.

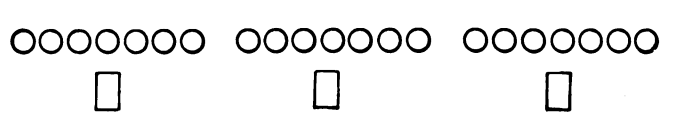
Each child will get $\frac{1}{3}$ of 21 nuts, which is 7 nuts.

Slate work: 3) 21 nuts, to be divided.
7 nuts, each one receives.

Divide 21 sheets of paper equally among 3 pupils. How many sheets will each pupil receive? What part of the paper will each get? (Make picture.)

Make a problem for this form: $\frac{1}{3}$ of 21 = 7.

4. I have 21 cents to spend for Christmas cards; if I pay 7 cents apiece, how many can I buy?



I can buy 1 card for 7 cents. I can buy as many cards for 21 cents as there are 7-cents in 21 cents.

There are *three* 7-cents in 21 cents. 21 cents will buy 3 cards at 7 cents each.

Slate work: 7 cents) 21 cents.

3 (7-cents in 21 cents).

21 cents will buy 3 cards at 7 cents each.

At 7 cents each, how many cakes can George get for 21 cents? (Make a picture for this problem. Express in figures.)

NOTE TO THE TEACHER. The picture language and the arithmetical form should be closely connected at this step: the one explains the other. No explanation should be *learned* as a *formula*.

5. Divide 21 cakes equally among 3 children. How many will each receive? (Picture figures.)

At $7 each, how many lamps can be bought for $21?

I have $21 to spend for 3 birthday presents. If I divide the money equally, what must I pay for each?

One of the three equal parts of 21 cents is how many cents?

21 cents contains 7 cents how many times?

Make a problem for each of these forms:

$\frac{1}{3}$ of 21 = 7. 21 ÷ 7, 3 times.

6. How much must Harry pay for 3 rubber balls, if each costs 7 cents?

One ball costs 7 cents; 3 balls will cost 3 times as much. Three times 7 cents are 21 cents.

Slate work: 7 cents, cost of 1 ball.

3 (number of times 7-cents are used).

21 cents, cost of 3 balls.

At $7 each, what will 3 rugs cost? (Make a picture for this problem.)

How many 7-dollars must you pay for the rugs?

Each make a problem for this form: $3 \times 7 = 21$.

If there are 7 peas in a pod, how many peas in 3 such pods? (Picture.)

7. 21 cubes are how many three-cubes?

7 three-cubes are how many?

21 is how many 3's? 21 = 7 threes. $21 \div 3 = 7$.

7 threes are how many? 7 threes = 21. $7 \times 3 = ?$

3 is what part of 21? $\frac{1}{7}$ of 21 = ? Seven sevenths of 21 = ?

How many 3's can you take out of 21?

Begin with 21 and subtract 3's.

Begin with 3 and add by 3's to 21.

Some sparrows were in the maple tree; 7, which was $\frac{1}{3}$ of the number, flew down. How many were there in the tree at first?

8. Make a picture and give the written form for each of the following problems:

A gardener takes 21 plants to market, and sells only one seventh of them; how many does he sell?

Give 21 shells to 7 children; how many will each receive if their shares are equal?

Anna gathered 3 wild roses from each of 7 branches of a rosebush; how many did she gather in all?

At 3 cents each, how many penholders can you get for 21 cents?

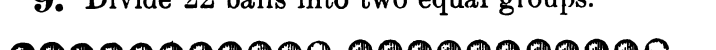
Divide 21 pansies equally among mother, sister, and aunt; how many will each receive?

Make problems for the following forms:

$$7 \text{ cents} \overline{)\, 21 \text{ cents}} \qquad 7 \overline{)\, 21 \text{ cents}}$$
$$3 \text{ times} \qquad\qquad 3 \text{ cents}$$

Answer the questions you have asked, giving slate work in full.

9. Divide 22 balls into two equal groups.



22 balls are how many eleven-balls?

2 eleven-balls are how many balls?

22 equals how many elevens?

22 = two 11's, or $22 \div 11 = 2$.

11 balls are what part of 22 balls? 11 is what part of 22? $\frac{1}{2}$ of 22 = ?

2 times 11 balls are how many? $2 \times 11 = ?$

22 peaches are how many times 11 peaches?

10. 22 balls are how many two-balls?

11 two-balls are how many?

11 twos are how many? $11 \times 2 = ?$

22 equals how many 2's? 22 = eleven 2's.

$22 \div 2 = 11$.

2 balls are what part of 22 balls?

2 is what part of 22?

Divide 22 bananas equally among 11 children; how many will each receive? What part of the whole will each receive?

11. Make problems for:

3 oranges) $\underline{21}$ oranges 3) $\underline{21}$ oranges

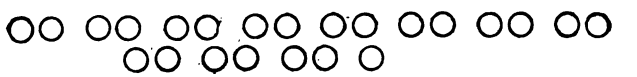
each receives

If I have 21 oranges and wish to give 3 oranges to each, etc.

Copy and learn:

$22 \div 11 = 2$.	$2 \times 11 = 22$.	$22 - 11 = 11$.
$22 \div 2 = 11$.	$11 \times 2 = 22$.	$\frac{1}{2}$ of $22 = 11$.
$21 \div 7 = 3$	$3 \times 7 = 21$	$21 - 7 = 14$.
$21 \div 3 = 7$.	$7 \times 3 = 21$.	$\frac{1}{3}$ of $21 = 7$.

12. Divide 23 into twos.



23 equals how many 2's? (Eleven twos and the half of one two, or $11\frac{1}{2}$ twos.) $23 \div 2 = 11\frac{1}{2}$. $11\frac{1}{2} \times 2 = ?$

At 2 cents a yard, how many yards of fancy paper can you buy for 23 cents, if you spend all the money? (As many yards as there are 2's in 23.)

13. Divide 23 apples equally between two boys. What part of the whole number will each receive? How many will each receive?

First boy,

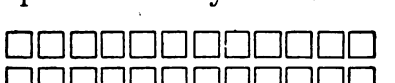
Second boy,

Each receives $\frac{1}{2}$ of 23 apples, which is $11\frac{1}{2}$ apples.

Divide 23 sheets of paper equally between 2 girls. What part of all the paper will each receive? How many sheets will each get?

$11\frac{1}{2}$ twos less $11\frac{1}{2}$ ones $= ?$ 23 contains 2 how many times? 23 contains $11\frac{1}{2}$ how many times?

14. 24 equals how many twelves? $24 \div 12 = ?$



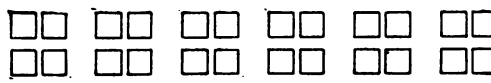
2 twelves are how many? $2 \times 12 = ?$

12 is what part of 24? $\frac{1}{2}$ of $24 = ?$

A dozen is what part of 24?

Roy bought two dozen pieces of colored crayon, and used $\frac{1}{2}$ of them the first term of school. How many did he use?

15. 24 equals how many twos? $24 \div 2 = ?$



12 twos are how many? $12 \times 2 = ?$

2 is what part of 24? One twelfth of $24 = ?$

One twelfth of 24 cherries are how many cherries?

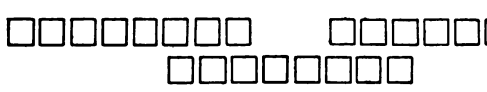
Show with objects the difference between one *twelve* and one *twelfth*.

24 cherries are how many times 2 cherries?

At 2 cents each, what will a dozen eggs cost?

$\frac{1}{12}$ of $12 = ?$ $\frac{1}{12}$ of $1 = ?$

16. 24 is how many 8's? $24 \div 8 = ?$



3 eights are how many? $3 \times 8 = ?$

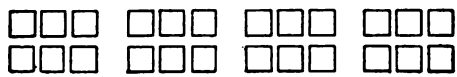
8 is what part of 24? $\frac{1}{3}$ of $24 = ?$

Count 24 by 8's. Subtract by 8's.

24 nails are how many times eight nails?

Give 24 nuts to 3 boys. How many will each receive, if the nuts are divided equally? (Picture.)

17. Divide 24 into 8 equal groups.



24 equals how many 3's? $24 \div 3 = ?$

8 threes equal how many? $8 \times 3 = ?$

3 is what part of 24? $\frac{1}{8}$ of $24 = ?$

Count 24 by 3's. Subtract by 3's.

$\frac{1}{8}$ of 24 lemons equals how many?

Divide a quire of paper (24 sheets) equally among 8 pupils. How many sheets will each receive?

Mary learned 3 lines of a poem each day for 8 days. How many lines of poetry did she learn?

How many 3-spools can you take out of a box containing 24 spools?

Some children were gathering golden-rod. They found that they had gathered in all 24 branches. They divided equally, and each had 3 branches. How many children were there?

Make problems for the following forms:

$24 \div 8 = 3$. 24 cents $\div 3 = 8$ cents. $3 \times 8 = 24$.

18. 24 equals how many 6's? $24 \div 6 = ?$

IIIIII IIIIII IIIIII IIIIII

4 sixes are how many? $4 \times 6 = ?$

6 is what part of 24? $\frac{1}{4}$ of $24 = ?$

Begin with 6 and add 6's until you have 24.

Henry read 6 pages of his new book on Monday, 6 on Tuesday, 6 on Wednesday, and 6 on Thursday. How many pages did he read?

George walked 6 miles each day for four days. How many miles did he walk?

Divide 24 maple leaves equally among 4 girls. How many will each get? (Picture and written form.)

At 4 cents each, how many oranges can you get for 24 cents? (Picture and written form.)

19. 24 equals how many 4's? $24 \div 4 = ?$

IIII IIII IIII IIII IIII IIII

6 fours are how many? $6 \times 4 = ?$

4 is what part of 24? $\frac{1}{6}$ of $24 = ?$

Add by 4's to 24.

At 4 cents a spool, what will 6 spools of thread cost?

At 5 cents a spool, how many spools of thread can be bought for 24 cents?

5 cents) 24 cents.

4 times (4 cents remaining).

I can buy 4 spools of thread and have 4 cents left.

Make a problem for each of the following forms:

24 nuts $\div$ 6 nuts = 4. $6 \times 4 = 24$.

24 nuts $\div$ 6 = 4 nuts.

Represent by objects:

One *six*, one *sixth* of six, one sixth of 1, one sixth of 24.

Add $\frac{1}{3}$ of 21 to $\frac{1}{3}$ of 24. $\frac{1}{2}$ of 22 + $\frac{1}{2}$ of 24 = ?

$21 \div 3 \times 2 \div 2 - 7 = ?$ $\frac{1}{3}$ of 24 + 6 = how many 3's?

20. 25 cents are how many 5-cents? $25 \div 5 = ?$ $5 \times 5 = ?$ $\frac{1}{5}$ of 25 = ?

Peaches are selling at 2 for 5 cents. How many can you buy for 25 cents? (Picture.) If you can get 2 for *one* 5-cents, how many can you get for *five* 5-cents?

Divide 25 into twos. 25 equals how many twos? 12 twos and half of one two are how many? $12\frac{1}{2}$ twos are how many ones? 25 contains 2 how many times?

John bought some molding for picture frames at 2 cents a foot. He spent 25 cents. How many feet did he buy? (Picture.)

Make problems for:

2 cents) 25 cents

$12\frac{1}{2}$ times

$12\frac{1}{2}$ times 2 = 25.

21. Draw upon your slate 25 circles to represent cents. Separate this 25 into 12's. 25 equals how many 12's?

NOTE. All common-sense forms of expression should have credit, as: two twelves and *one* of another twelve; two twelves and one twelfth of twelve; $2\frac{1}{12}$ twelves.

Helen has 25 cents to spend for lace at 12 cents a yard; how many yards can she buy?

1 yd. OOOOOOOOOOOO
1 yd. OOOOOOOOOOOO O $\frac{1}{12}$ yd.

(She can buy as many yards as there are 12's in 25.)

At 12 cents a foot, how many feet of gilt molding can be bought for 25 cents? (Picture.)

22. What will $2\frac{1}{12}$ feet of silver wire cost at 12 cents a foot? (Picture.)

Make problems for:

12 cents) 25 cents
$2\frac{1}{12}$ times

$2\frac{1}{12}$ times 12 = 25.

Divide 25 feet of kite string equally between two boys; what is each one's share. (Picture.)

Make a problem for:

2) 25 pineapples
each receives

I paid 25 cents for 2 pounds of butter; what is that a pound?

23. Divide 25 into threes.

OOO OOO OOO OOO
OOO OOO OOO OOO O

25 equals how many threes? ($8\frac{1}{3}$ threes, or 8 threes and $\frac{1}{3}$ of one three.)

$25 \div 3 = ?$ $8\frac{1}{3} \times 3 = ?$

At 3 cents a pound, how many pounds of salt can you buy for 25 cents?

24. Divide 25 into eights.

25 equals how many eights? (3 eights and one of another eight.)

$25 \div 8 = ?$ $3\frac{1}{8} \times 8 = ?$ $8\overline{)25}$

At 8 cents a pound, how many pounds of rice can you buy for 25 cents?

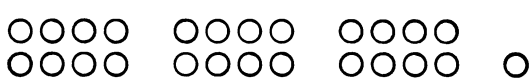
25. Divide 25 sticks of candy equally among 8 boys. How many will each receive? (Make a picture to show this.) Each will receive what part of the candy?

Divide 25 crackers equally among three children. (Picture.) How many will each receive?

Three boxes of strawberries cost 25 cents. How much is that a box?

8 spools of basting thread are worth 25 cents. How much is that for each spool?

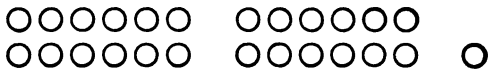
26. Divide 25 into fours.



25 equals how many 4's? $25 \div 4 = ?$ $6\frac{1}{4} \times 4 = ?$

Spend 25 cents for colored paper at 4 cents a sheet. How many sheets can you buy?

27. Divide 25 into sixes.



25 equals how many 6's? $25 \div 6 = ?$ $4\frac{1}{6} \times 6 = ?$

At 6 cents a quart, how many quarts of milk can you get for 25 cents?

Put 25 quarts of cherries into 4 boxes. How many quarts will each box contain if you divide them equally? (Picture.)

George gives his pony 25 ears of corn in 6 days. How much is that a day, if the same amount is given each day? (Picture.) How much will the horse get the first day? This is what part of 25 ears?

28. REVIEW.

$3 \times 8 = ?$	$4 \times 6\frac{1}{2} = ?$	$\frac{1}{2}$ of $26 = ?$	$\frac{1}{2}$ of $23 = ?$
$7 \times 3 = ?$	$6 \times 4\frac{1}{6} = ?$	$2 \times 13 = ?$	$\frac{1}{5}$ of $25 = ?$
$4 \times 6 = ?$	$24 \div 3 = ?$	$\frac{1}{4}$ of $26 = ?$	$\frac{1}{3}$ of $26 = ?$
$3 \times 8\frac{1}{3} = ?$	$25 \div 3 = ?$	$\frac{1}{3}$ of $21 = ?$	$\frac{1}{4}$ of $25 = ?$

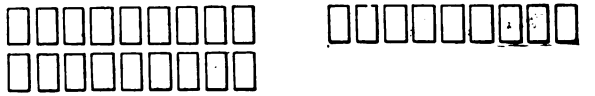
Make problems for:

$\frac{1}{2}$ of $25 = 12\frac{1}{2}$. $25 \div 2 = 12\frac{1}{2}$. $3 \times 8 = 24$.

$24 \div 3 = 8$. $24 \div 8 = 3$.

Give the written form in answer to each problem.

29. Take 27 cards; separate them into nines.



27 cards equal how many nine-cards?

27 equals how many 9's? $27 \div 9 = ?$

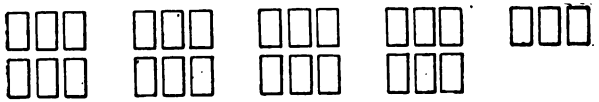
3 nines are how many? $3 \times 9 = ?$

9 is what part of 27? $\frac{1}{3}$ of $27 = ?$

Count 27 by 9's. Subtract 9's from 27 to 0.

At \$9 each, what will 3 clocks cost? (Draw picture.)

30. 27 equals how many 3's? $27 \div 3 = ?$



9 threes are how many? $9 \times 3 = ?$

3 is what part of 27? One ninth of $27 = ?$

Count 27 by 3's.

One ninth of 27 cents is how many cents?

At \$3 each, what will 9 ostrich feathers cost? (Picture.)

Make problems for these forms about things that grow on trees:

$3 \times 9 = 27.$	$9 \times 3 = 27.$	$\frac{1}{3}$ of $27 = 9.$
$5 \times 5 = 25.$	$25 \div 5 = 5.$	$27 \div 9 = 3.$

31. 28 buttons are how many 7's? $28 \div 7 = ?$

4 sevens equal what? $4 \times 7 = ?$

7 is what part of 28? $\frac{1}{4}$ of $28 = ?$

How many times can I take 7 buttons out of 28 buttons?

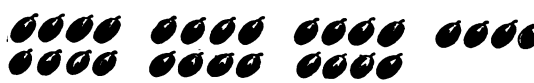
28 contains 7 how many times?

Take $\frac{1}{4}$ of 28 buttons away, how many fourths will be left? How many buttons will be left?

Make a problem for each of these forms:

$28 \div 7 = 4.$ $4 \times 7 = 28.$ $\frac{1}{4}$ of $28 = 7.$

28 buttons equals how many four-buttons?



32. 28 equals how many 4's? $28 \div 4 = ?$

7 fours are how many? $7 \times 4 = ?$

4 is what part of 28? One seventh of $28 = ?$

Count by 4's to 28.

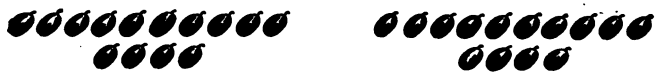
How many miles do I walk in 7 days if I walk 4 miles each day?

I will give you 28 cents to spend for oranges. If they cost 4 cents apiece, how many can you get? (Picture.)

A baker sold 28 loaves of bread to 7 customers. How many loaves will each receive, if the bread is

sold in equal shares? What part of the whole did each buy?

Separate 28 into 2 equal groups.



REVIEW.

$3 \times 9 = ?$	$27 \div 9 = ?$	$\frac{1}{3}$ of $27 = ?$	$\frac{1}{4}$ of $29 = ?$
$4 \times 7 = ?$	$28 \div 7 = ?$	$\frac{1}{4}$ of $28 = ?$	$\frac{1}{2}$ of $28 = ?$
$4 \times 7\frac{1}{4} = ?$	$27 \div 3 = ?$	$\frac{1}{9}$ of $27 = ?$	$\frac{1}{7}$ of $29 = ?$

Make problems for:

$3)\overline{27}\ 9$ $\quad$ $4)\overline{29}\ 7\frac{1}{4}$ $\quad$ $7 \times 4 = 28$ $\quad$ $4 \times 7 = 28$

Give the written form in answer to your problems. Each term must be properly labeled.

33. 30 equals how many tens?

3 tens equal what? $30 \div 10 = ?$

10 is what part of 30? $3 \times 10 = ?$

How many times 10 in 30? $\frac{1}{3}$ of $30 = ?$

Give 30 marbles to 3 boys. How many will each receive, if they are divided equally?

34. 30 equals how many threes?

10 threes equal what? $30 \div 3 = ?$ $\quad 10 \times 3 = ?$

3 is what part of 30? One tenth of 30 = ?

Count 30 by 3's.

How many times can 3 be taken out of 30?

How many wheels have 10 tricycles?

If you pay 3 cents apiece for peaches, how many can you get for 30 cents?

35. 30 equals how many 6's?

5 sixes are how many? $30 \div 6 = ?$ $5 \times 6 = ?$

6 is what part of 30? One fifth of 30 = ?

Add by 6's to 30. Begin with 30 and subtract 6's.

How many times will 30 melons fill a basket which holds 6 melons?

30 equals how many fives?

36. Give 30 acorns to 6 boys. How many will each receive if they are divided equally?

6 fives equal what? $30 \div 5 = ?$ $6 \times 5 = ?$

5 is what part of 30? One sixth of 30 = ?

How many times can I ride for 30 cents, if one street-car fare is 5 cents?

37. Divide 30 cents into fifteens.

30 cents are how many 15-cents?

15 cents are what part of 30 cents?

38. REVIEW.

At 10 cents each, how many pineapples can you get for 30 cents?

Mary wishes to plant some pinks in a triangular garden bed. How many plants will she use if she plants 10 on each of the 3 sides? (Picture.)

How many 5-cent pieces in 30 cents? (Picture.)

A church is lighted by 5 lamps of 6 burners each. How many burners in all?

George planted some hyacinth bulbs in 5 boxes, planting 6 bulbs in each box. How many did he plant in all?

A boy walks 10 squares in 30 minutes. At that rate, how long is he in walking one square?

I bought 4 verbenas for 30 cents. What did each plant cost, if they are of equal value?

Make problems for the following forms:

$30 \div 5 = 6.$ $30 \div 6 = 5.$ $\frac{1}{5}$ of $30 = 6.$ $6 \times 5 = 30.$

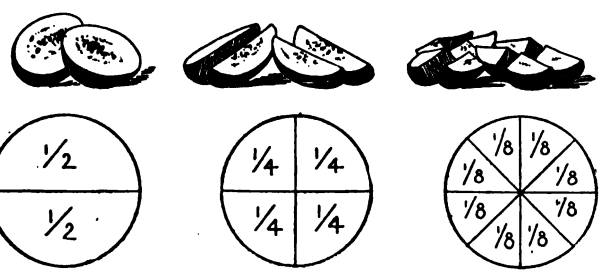
$3\overline{)30}$ $4\overline{)30}$ $4\overline{)29}$ $4 \times 7\frac{1}{2} = 30.$

10 $7\frac{1}{2}$ $7\frac{1}{4}$

39. Copy and learn:

$21 \div 7 = 3.$	$3 \times 7 = ?$	$27 \div 9 = 3.$	$3 \times 9 = ?$
$21 \div 3 = 7.$	$7 \times 3 = ?$	$27 \div 3 = 9.$	$9 \times 3 = ?$
$22 \div 11 = 2.$	$2 \times 11 = ?$	$28 \div 2 = 14.$	$14 \times 2 = ?$
$22 \div 2 = 11.$	$11 \times 2 = ?$	$28 \div 14 = 2.$	$2 \times 14 = ?$
		$28 \div 7 = 4.$	$4 \times 7 = ?$
$24 \div 12 = 2.$	$2 \times 12 = ?$	$28 \div 4 = 7.$	$7 \times 4 = ?$
$24 \div 2 = 12.$	$12 \times 2 = ?$		
$24 \div 8 = 3.$	$3 \times 8 = ?$	$30 \div 15 = 2.$	$2 \times 15 = ?$
$24 \div 3 = 8.$	$8 \times 3 = ?$	$30 \div 2 = 15.$	$15 \times 2 = ?$
$24 \div 6 = 4.$	$4 \times 6 = ?$	$30 \div 10 = 3.$	$3 \times 10 = ?$
$24 \div 4 = 6.$	$6 \times 4 = ?$	$30 \div 3 = 10.$	$10 \times 3 = ?$
		$30 \div 6 = 5.$	$5 \times 6 = ?$
$25 \div 5 = 5.$	$5 \times 5 = ?$	$30 \div 5 = 6.$	$6 \times 5 = ?$

40. COMPARISON OF HALVES, FOURTHS, AND EIGHTHS.



A whole melon can be divided into how many halves? How many fourths?

Fold a paper square into two equal triangles. One of the triangles is what part of the whole square?

Fold the same square so as to make four equal triangles. What part of the whole square is one of the small triangles?

$\frac{1}{2}$ is equal to how many fourths?

$\frac{1}{2}$ and $\frac{1}{4}$ make how many fourths?

$\frac{1}{2} + \frac{2}{4}$ equal how many fourths?

Fold your square so as to make eight equal triangles. One of the triangles is what part of the whole square? Two of the triangles are what part of the whole?

If three of the triangles were cut out of the square, what part of the whole would be left?

$\frac{1}{4}$ of the square is equal to how many eighths?

$\frac{1}{2}$ is equal to how many?

$\frac{3}{4}$ are equal to how many eighths?

$\frac{3}{4}$ of a whole cheese are equal to how many eighths of the cheese?

$\frac{1}{4} + \frac{1}{8}$ are how many eighths? $\frac{1}{4} + \frac{3}{8} = ?$

$\frac{1}{2} + \frac{3}{8}$ are how many eighths?

41. From your folded squares find the answers to the following questions:

$\frac{1}{2} + \frac{2}{8}$.	$\frac{8}{8} - \frac{1}{8}$.	$\frac{1}{4} - \frac{1}{8}$.	$\frac{1}{2} - \frac{1}{4}$.
$\frac{5}{8} + \frac{1}{4}$.	$\frac{7}{8} - \frac{3}{8}$.	$\frac{2}{4} - \frac{1}{8}$.	$\frac{1}{2} - \frac{2}{8}$.
$\frac{1}{4} + \frac{3}{8}$.	$\frac{3}{4} - \frac{1}{4}$.	$\frac{1}{4} - \frac{2}{8}$.	$\frac{1}{2} - \frac{3}{8}$.

42. Draw upon your slate a square; divide it into eight equal oblongs, and find from the slate the answers to the following questions:

2 times $\frac{1}{4} = ?$ $3 \times \frac{2}{4} = ?$ $4 \times \frac{1}{4} = ?$ $5 \times \frac{2}{4} =$ how many wholes?

2 times $\frac{2}{4} = ?$ $2 \times \frac{3}{8} = ?$ $3 \times \frac{4}{8} = ?$ $3 \times \frac{3}{8} =$ how many wholes?

2 times $\frac{3}{8} = ?$ $2 \times \frac{4}{8} = ?$ $2 \times \frac{5}{8} = ?$ $2 \times \frac{8}{8} =$ how many wholes?

$4 \times \frac{1}{8} = ?$	$3 \times \frac{1}{4} = ?$	$\frac{1}{4}$ of $\frac{1}{2} = ?$
$4 \times \frac{2}{8} = ?$	$\frac{1}{2}$ of $\frac{1}{2} = ?$	$2 \times \frac{3}{8} = ?$
$2 \times \frac{1}{2} = ?$	$\frac{1}{2}$ of $\frac{1}{4} = ?$	$4 \times \frac{1}{2} = ?$

Mary made a cake for tea; half of it was eaten, and the remainder was divided equally among four visitors. What part of the whole cake did each visitor receive?

George had a ball of twine for his kite; he used half of it, and divided the remainder equally between two other boys. What part of the whole ball of twine did each boy get?

43. Take two equal squares of paper. Fold each into four equal smaller squares; call them square crackers, and give them to four children, so that they shall have equal shares. What part of the two large squares does each child receive? What part of one square?

NOTE TO THE TEACHER. Distribute all the parts of one square first.

To how many children did you give the two squares? One of the four equal parts of anything is called what?

Place the small squares together again so as to form the two large squares.

$\frac{1}{4}$ of 2 squares is what part of one of the squares? $\frac{1}{4}$ of 2 pies = ? $\frac{1}{4}$ of 2 apples = ? $\frac{1}{4}$ of 2 melons = ?

Divide 2 sticks of candy equally among four boys. What part of the whole will each boy receive? What part of one stick is that?

44. Take three equal squares of paper. Divide these equally among four children. (Fold each into four smaller squares.) What part of the three large squares does each child receive? What part of one square?

Into how many equal parts did you divide the three squares? One of these equal parts is called what?

Place the small squares together again so as to form the three large squares you had at first. $\frac{1}{4}$ of 3 squares is what part of one square?

Find what part $\frac{1}{4}$ of 3 tooth-picks is of one whole tooth-pick.

Divide 3 oranges equally among 4 boys. What part of the 3 will each receive? $\frac{1}{4}$ of 3 is what part of 1?

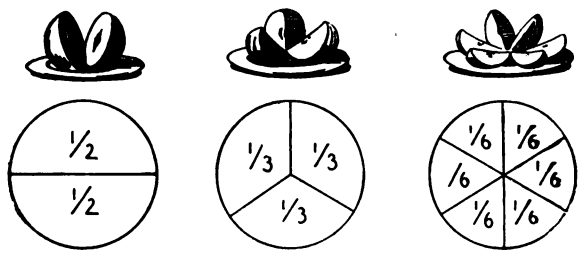
Plant 3 potatoes in 4 hills. If you divide them equally, what part of 1 potato will be in each hill? (Make a picture to show this.)

Give 3 bananas to 4 girls, dividing them equally. How many will each girl receive?

Divide 23 melons equally among 4 boys. What is each boy's share? (Picture.)

I wish to put 27 quarts of blackberries into 4 jars, putting the same number of quarts into each. How many quarts will each jar contain?

45. HALVES, THIRDS, AND SIXTHS.



One third of an orange is equal to how many sixths?

One half is how many sixths?

Fold a square of paper into two equal oblongs; one of the oblongs is what part of the whole?

Measure and draw (parallel to the line made by folding) lines which shall divide the paper square into three equal oblongs. One of these oblongs, made by drawing, is what part of the whole square?

How does one of these oblongs compare in size with $\frac{1}{2}$ the square? Which is larger, $\frac{1}{2}$ or $\frac{1}{3}$?

A third and half of a third will make what part of the whole square?

Fold your square into six equal oblongs. One of the oblongs is what part of the whole square?

$\frac{3}{6}$ are what part of the whole? $\frac{1}{2}$ is equal to how many sixths?

$\frac{2}{6}$ are what part of the whole?

Take away $\frac{1}{3}$ of the square; how many sixths are left?

46. Draw an oblong on your slate; divide it into six equal oblongs. One of these is what part of the whole? Three of the small oblongs are what part of the large one?

Look at your drawing and find the answers to these questions:

$\frac{1}{3}$ and $\frac{1}{6}$ are how many sixths? $\frac{2}{6} + \frac{1}{3}$ are how many sixths? $\frac{1}{2} + \frac{1}{3}$ are how many sixths?

$\frac{1}{3} + \frac{1}{3} = ?$	$\frac{1}{2} + \frac{1}{6} = ?$	$\frac{6}{6} - \frac{5}{6} = ?$	$\frac{5}{6} - \frac{1}{3} = ?$
$\frac{3}{6} + \frac{1}{3} = ?$	$\frac{1}{2} + \frac{2}{6} = ?$	$\frac{6}{6} - \frac{1}{3} = ?$	$\frac{4}{6} - \frac{1}{2} = ?$
$\frac{1}{6} + \frac{2}{3} = ?$	$\frac{3}{6} + \frac{1}{2} = ?$	$\frac{6}{6} - \frac{1}{2} = ?$	$\frac{5}{6} - \frac{2}{3} = ?$
$4 \times \frac{1}{6} = ?$	$3 \times \frac{1}{3} = ?$	$6 \times \frac{1}{6} = ?$	$3 \times \frac{2}{6} = ?$

$\frac{1}{6}$ are how many thirds? $\frac{3}{6}$ are how many halves? $\frac{2}{6}$ are how many thirds?

47. A grocer bought a cheese, of which he sold on Monday $\frac{1}{6}$, and on Tuesday $\frac{1}{3}$. What part of the whole cheese remained unsold?

Henry is 24 miles from home. In returning, he rides $\frac{1}{3}$ of the distance on his bicycle, $\frac{2}{6}$ on horseback, and walks the remainder of the distance. How many miles does he walk?

12 cents is half my money; how many cents have I? Two times the half of anything equals what?

6 cents is $\frac{1}{3}$ of Ella's money; how many cents has she? 3 times $\frac{1}{3}$ equals what?

Find $\frac{1}{3}$ of 2. Take two squares. Fold each into three equal oblongs. Divide these two squares equally among three children. One child receives what part of the whole?

Place the oblongs so as to form the two squares again.

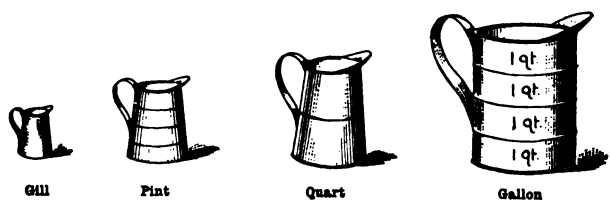
$\frac{1}{3}$ of 2 squares is what part of one square?

$\frac{1}{3}$ of 2 is what part of 1?

$\frac{1}{3}$ of 2 cakes is what? $\frac{1}{3}$ of 2 pineapples.

Divide 2 pies equally among three visitors; how much will each receive? (Picture.)

48. Put 2 pints of milk into 3 cups, so that each cup shall contain the same quantity as the others. How much in each?



Frank picked 23 quarts of cherries; he kept $\frac{1}{3}$ of them, and divided the remainder equally between two neighbors. How many quarts did each reecive?

A quart of milk is how many pints?

A pint is what part of a quart?

At 3 cents a pint, what will a quart of milk cost?

Four gills make a pint. How many gill bottles can be filled from a pint of oil?

1 gill is what part of a pint? 2 gills are what part of a pint?

A soup ladle holds 2 gills. How many times can you fill it from a pint of soup? How many times from a quart?

If 2 gills of lemon extract are worth 25 cents, what is 1 gill worth, at the same rate?

George sold six 3-gill glasses of lemonade. How many pints did he sell?

It takes 4 quarts to fill a gallon measure; one quart is what part of a gallon? 2 quarts are what part of a gallon?

At 8 cents a quart, what will $4\frac{1}{2}$ quarts of vinegar cost?

How many 1-gallon jugs will be needed to hold 28 quarts of maple molasses?

How many quart cans will be needed to hold 4 gallons of raspberries?

4 gills (gi.) = 1 pint (pt.).
2 pints = 1 quart (qt.).
4 quarts = 1 gallon (gal.).

Liquids, such as milk, vinegar, and molasses, are measured by these measures. This way of measuring is called Liquid Measure. Name other liquids measured in this way.

49. MISCELLANEOUS PROBLEMS.

1. How many 3-cents in 27 cents?

2. Ella found 4 eggs each day for a week; how many dozen did she find?

3. How many petals have 6 violets, if each flower has 5 petals?

4. John worked four weeks, and earned a dollar each working day; his brother earned half as much; what did each earn?

5. Emma had 3 dimes; she spent 6 cents for a pencil, and for the remainder she bought 3 plants for the schoolroom; what did each plant cost, if they were of equal value?

6. 27 feet is three times the length of a ladder; what is its length?

7. Mary made 25 sponge-cakes; she saved 5 to take to school, and divided the remainder equally among 4 brothers and sisters; how many did each receive?

8. Divide $2\frac{1}{2}$ dozen crackers equally among 5 boys.

9. At $12\frac{1}{2}$ cents a can, what will 2 cans of corn cost?

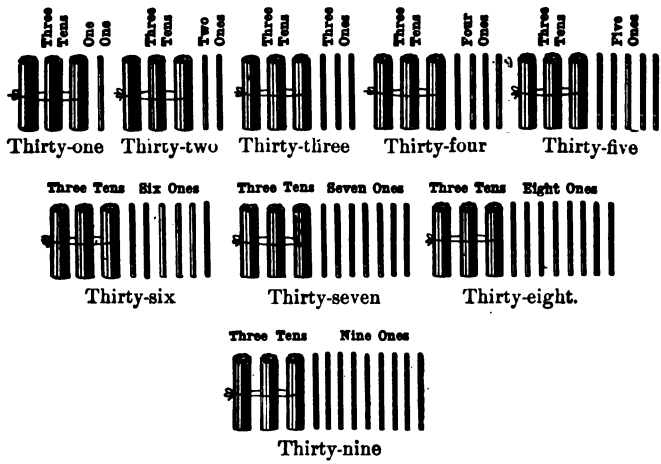
10. I bought 3 pounds of raisins for 28 cents. How much is that a pound?

11. Lemons are selling at 20 cents a dozen. What is $\frac{1}{3}$ of a dozen worth?

12. Add $\frac{1}{3}$ of 27 to $\frac{1}{4}$ of 28. $3 \times 7 + 6 =$ how many 9's. One fifth of $25 + 6 = \frac{1}{2}$ of what? $3 \times 9 + (?) = 30$. $6 \times 5 \div 10$ is the half of what? 3 times one fifth of $30 + 3 = ?$

50. WRITING NUMBERS.

FROM THIRTY TO ONE HUNDRED.



Find the counters and write the figures for *three tens* and *one one*; *three tens* and *two ones*.

Add *one* each time, and represent by figures through *three tens* and *nine*.

Three tens and two ones are how many ones?

Three tens and five ones are how many ones?

Three tens and nine ones are how many ones?

Read these numbers: 31, 32, 33, 34, 35, 36, 37, 38, 39.

51. Add 1 to three tens and 9 ones. How many tens are there? Write the number in figures.

Four tens are how many ones?

Count by ones, beginning with *forty*, until you have four tens and nine ones.

Read these numbers: 40, 41, 42, 43, 44, 45, 46, 47, 48, 49.

Tell the number of tens and ones each represents.

52. Copy and read the following:

10	30	48	42	31	17
22	44	29	24	13	27
11	23	16	16	18	36
33	32	40	41	21	26
19	15	37	14	12	45

The right-hand figure of each of these numbers expresses what?

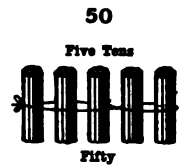
When a number is expressed by two figures, the right-hand figure always stands for ones, and the left-hand figure for tens.

Write in words:

30	19	23	42	18	35
28	47	33	39	44	17
11	14	48	47	22	36

53. With your counters in hand, add 1 to 4 tens and 9 ones.

How many tens and ones have you? Write the figures for this number. 5 tens are how many ones?



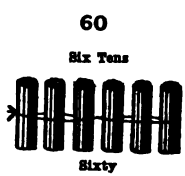
Count by ones, beginning with fifty, until you have five tens and nine ones. Write each number as you count. Read: 50, 51, 52, 53, 54, 55, 56, 57, 58, 59.

Write the tens and ones each represents.

56 is how many tens and ones? 56 is how many ones?

Show with your counters the number of tens and ones in 58. Show the number of ones.

54. Find six tens with your sticks. Express six tens in figures.



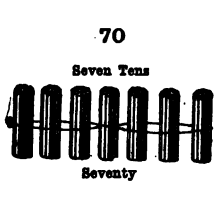
Begin with sixty, and count by ones through sixty-nine. Express each number in figures as you count.

Read these numbers as tens and ones: 60, 61, 62, 63, 64, 65, 66, 67, 68, 69.

How many *ones* in six tens and four ones? In six tens and nine ones?

Six tens are how many more than five tens?

55. Find seven tens, and express this number in figures.



Count by ones, beginning with seventy, until you have seven tens and nine ones.

Express each number in figures as you count. Read: 70, 71, 72, 73, 74, 75, 76, 77, 78, 79

Copy and read the following:

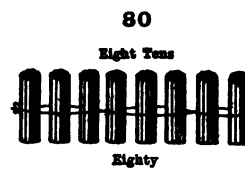
55	73	36	69	79	43
64	37	63	60	53	34
46	48	77	51	35	71
75	70	28	15	27	17
57	19	59	78	72	62

Write the last column in words.

Write in figures a number which is ten more than 30; one that is ten more than 50; ten more than 60; ten less than 70.

Sixty is how many more than 50? 20 is how many more than 10? 20 is how many less than 30?

56. Add one to 7 tens and 9 ones. How many tens have you? Write the number in figures.



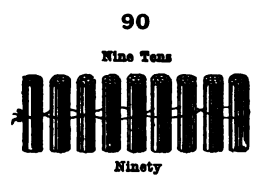
Count by ones through eight tens, and nine ones. Write each number in figures. 80, 81, 82, 83, 84, 85, 86, 87, 88, 89.

How many tens and ones does the third number from the left represent?

Lay down the counters for each of these numbers: 84, 88, 81, 87, and 89.

How many ones in eighty-nine? How many tens and ones in 89 ones?

57. Add 1 to eight tens and 9 ones. How many tens are there? Write the number in figures.



Count by ones, and write the numbers through nine tens and nine ones. 90, 91, 92, 93, 94, 95, 96, 97, 98, 99.

Tell how many tens and ones each represents.

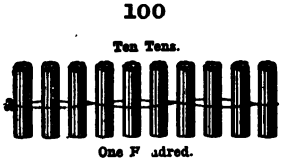
Ninety ones are how many tens and ones.

97 ones are how many tens and ones?

How many ones in 9 tens and 3 ones? 9 tens and 5 ones? 9 tens and 8 ones? 8 tens and 6 ones? 7 tens and 4 ones? 5 tens and 9 ones?

99 is the largest number which can be expressed by two figures.

58. With your counters in hand, add one to 9 tens and 9 ones. How many tens have you? How many ones, beside the ten tens? Ten *tens* are called one hundred. One hundred is how many tens? How many ones? (Untie the bundles.) *One* ten is what part of *ten tens?*



Find one *one* (beside the one hundred) with the sticks. Place it on your slate or against the blackboard.

Find one *ten* with the sticks also, and place it to the left of the one *one.*

Place the *one hundred* to the left of the one *ten.*

Write under the one *one* the figure which stands for 1 one.

Write under the one *ten* the figure which stands for 1 ten.

Write the figure 1 under the one hundred of sticks.

Point to the figure 1 which means 1 one; to the figure 1 which means 1 ten; to the figure 1 which means 1 hundred.

Remove the 1 one. In its place write the figure which means *no ones.* Remove the 1 ten; in its place write the figure which stands for *no tens.* How many ones, tens, and hundreds have you?

Read the number, beginning at the left.

1 hundred is written to the left of the tens.

100 equals ten *tens*. 100 is one hundred *ones*.

59. ADDITION AND SUBTRACTION.

REVIEW OF NUMBERS FROM TEN TO TWENTY.

Find all the sums which can be formed by adding any two numbers below ten.

Read sums only.

6	4	9	6	7	5	9	8	5	9	8	7	8	7	8	9	7	6	3	9
2	8	5	9	4	6	3	7	9	7	5	3	7	6	6	9	5	4	9	6
7	7	9	7	8	9	5	9	8	6	7	6	8	5	3	9	6	4	4	8
8	9	4	3	9	2	4	4	7	3	2	7	4	3	8	8	5	9	7	6

Subtract the lower number; give results only:

9	10	13	15	14	12	16	15	17	13	14	18
4	6	9	8	6	7	9	9	8	6	9	9
12	11	17	13	16	15	14	17	12	15	16	11
8	7	9	8	7	7	5	13	5	6	12	6

60. Separate 21 cubes into two unequal groups.

If you take the smaller number out of the whole, what will remain?

If you take the larger number from the sum of the two parts, what will remain? $21 - 7 = ?$ $21 - 14 = ?$

21 cubes are how many more than 7 cubes?

Ella has 21 blocks and Frank has 7; how many more has Ella than Frank?

If you take out of Ella's blocks a number equal to Frank's, what will be left?

What is the difference between 21 and 7?

21 is 14 more than what number?

If my desk is 7 inches longer than my slate, the slate is how many inches *shorter* than the desk? (Measure.)

61. 20 books + 3 books equals how many books?

20 nails + 5 nails = ? 20 ones + 3 ones = ?

2 tens + 7 tens = ?

Write these numbers and add them. Add ones first in each example.

20	24	30	20	30	40	20	32	43
6	2	9	10	40	50	16	7	4

Finding the sum of two or more numbers is called Addition.

The sign of Addition (+) is called *plus*. The numbers between which it is placed are to be added.

The sign (=) means *equals*. 8 + 6 = 14, is read, 8 *plus* 6 *equals* 14.

Add 12, 49, and 33.

$$\begin{array}{r} 12 \\ 49 \\ 33 \\ \hline 94 \end{array}$$

Add *ones* first, naming results only; thus, 3, 12, 14 ones (1 ten and 4 ones). Write the 4 ones in ones' place below the line, and add the 1 ten with the tens. 4, 8, 9 tens. Write 9 tens in tens' place. The sum is 94.

Copy and add:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
12	25	36	44	16	29	34	28
14	10	11	14	25	16	23	16
16	12	14	10	12	11	39	51

(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
28	39	28	18	29	67	58	45
16	14	26	54	14	17	13	16
2	3	13	17	23	2	4	14

62. WRITING NUMBERS.

ONE HUNDRED TO FIVE HUNDRED.

Take the counters and find 1 hundred, 2 tens, 4 ones.

What number have you? How many ones in all? Write the number.

Find with the sticks and write:

1 hundred,	3	tens,	7	ones.	1 hundred,	9	tens,	0	ones.
1	"	5	"	6 "	1	"	6	"	5 "
1	"	8	"	3 "	1	"	1	"	1 one.
1	"	1	"	2 "	1	"	0	"	0 ones.

How many ones in the first number?

Tell how many ones in each of the other numbers.

Which is greater, 6 ones or 5 tens? One hundred or 6 tens?

How many tens make one hundred?

Begin with 1 hundred, and write in figures all the numbers through 1 hundred, 9 tens, and 9 ones.

Add 1 to 199; how many tens have you? How many ones? Write the number.

134
216
159
178

63. What does the figure 4 mean in the number 134? Because the figure 4 means 4 ones, it is written in ones' place. For what do the 6, 9, and 8 stand? Ones are always written in ones' place.

What does the figure 3 mean in the first number? Why is it written in *tens' place?*

The figure 1 in the second number means what?

The 5 and 7 stand for what?

Tens are always written in tens' place.

The figure 1 in the first number means what?

The figure 2 in the second number means what?

Because the figure 1 means one hundred, it is written in *hundreds' place.*

In what place is the figure 2 written?

Hundreds are always written in hundreds' place.

64. Ones' place, tens' place, and hundreds' place make *ones' period.*

Copy and read these numbers:

124	101	116	173	119	112
186	111	105	113	191	121
210	198	115	131	109	200
181	106	137	103	129	201

Ones' Period.		
Hundreds' place.	Tens' place.	Ones' place.
1	3	4
2	1	6
1	5	9

2 in tens' place means how many? 2 in ones' place means how many?

Find with the counters and write the numbers from 200 to 300.

65. Write in figures:

2 hundred,	5	tens,	3	ones.		3 hundred,	0	tens,	0	ones.	
1	"	6	"	7	"	2	"	2	"	2	"
3	"	7	"	9	"	5	"	0	"	0	"
4	"	3	"	8	"						

The first number equals how many ones?

Which is greater, 3 hundred or 3 tens?

5 hundred is how many more than 3 hundred?

Read the following:

311	222	202	314	384	404
210	333	212	341	448	401
413	331	221	413	444	309
125	313	211	431	414	319

414 is how many more than 313? 330 is how many more than 230? 450 is how many less than 500?

66. Copy and add:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
79	99	89	38	38	97	38	56	2
13	03	13	04	16	49	17	57	12
66	25	25	72	72	21	82	23	49
21	51	41	62	52	11	41	41	63
11	11	12	13	12	11	12	11	93

(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
76	39	55	59	50	98	78	72	34
64	34	24	34	59	57	15	45	75
23	73	75	72	34	12	61	41	22
12	33	21	14	31	12	25	16	12
12	11	11	11	11	10	11	15	57

67. ADDING AND SUBTRACTING BY ENDINGS.

Write ten numbers ending in 0; add one to each of these numbers.

10	20	30	40	50	60	70	80	90	100
1	1	1	1	1	1	1	1	1	1

With what figure does each sum end?

Write ten numbers ending in 1; subtract 1 from each number.

11	21	31	41	51	61	71	81	91	101
1	1	1	1	1	1	1	1	1	1

With what figure does each answer end?

Add 1 to all numbers below 100, which end in 1; in 2, 3, 4, 5, or 6.

If you subtract 1 from numbers ending in 2, with what figure does each answer end?

Write 10 numbers ending in 3, and subtract 1 from each number.

One from numbers ending in 9 gives what ending figure?

Write a table subtracting 1 from numbers ending in 0.

68. 8 + 1 AND 1 + 8.

Add, giving first the ending figure of the sum, and then the whole sum.

8	18	28	38	48	58	68	78	88	98
1	1	1	1	1	1	1	1	1	1

1	11	21	31	41	51	61	71	81	91
8	8	8	8	8	8	8	8	8	8

Add, beginning at the left.

1, 8, 1, 1, 8, 1, 1, 8. 1, 1, 8, 1, 8, 1, 1, 8.
8, 1, 1, 8, 1, 1, 1, 8, 1, 1, 8, 1, 8, 1, 1, 1.
9, 6, 3, 1, 1, 1, 8, 1, 8, 1, 1, 8, 1, 1, 1, 8.
6, 8, 4, 1, 1, 8, 1, 1, 1, 8, 1, 8, 1, 1, 1, 8.

69. 9 + 1 AND 1 + 9.

Add 9 to numbers ending in 1.

1	11	21	31	41	51	61	71	81	91
9	9	9	9	9	9	9	9	9	9

Add:

1, 9, 9, 1, 1, 9, 1, 9, 1, 9, 1, 9, 1, 9, 1, 9.
9, 1, 1, 9, 9, 1, 1, 9, 9, 1, 1, 9, 1, 9, 9, 1.
8, 8, 4, 1, 9, 1, 9, 8, 1, 1, 9, 1, 9, 1, 9.
9, 8, 3, 9, 1, 1, 9, 1, 9, 9, 1, 1, 9, 5, 1.
8, 7, 5, 9, 1, 8, 1, 1, 9, 1, 1, 9, 1, 9, 9, 1.

Add, beginning at the bottom of the line.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
9	1	1	9	2	9	8	9	8	9	9	1
1	9	1	1	8	1	1	1	1	1	1	9
9	1	8	9	1	9	8	3	9	1	9	1
1	9	1	9	8	1	1	6	1	9	1	1
1	1	8	1	1	1	9	9	1	9	1	5
8	1	1	9	1	1	1	1	9	1	8	4
1	9	9	1	9	8	1	1	9	1	1	1
9	9	1	1	1	1	8	9	1	9	9	9
1	1	1	9	1	9	1	1	1	1	1	1
1	4	1	5	8	7	7	3	1	5	9	7
9	8	9	9	1	4	5	7	3	7	6	6
9	8	9	6	9	9	8	9	5	7	5	6

70. Slate Exercises.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
99	99	99	88	98	19	99	89	99	91
91	11	11	11	91	91	99	19	11	19
11	11	11	98	19	11.	11	91	99	91
19	88	19	11	91	18	11	11	11	19
99	91	81	99	11	89	19	99	11	11
11	19	90	11	19	10	89	11	91	91
11	11	18	11	89	91	11	11	98	19
81	19	11	31	11	19	15	81	14	16
93	46	99	39	99	94	47	98	68	46
75	95	61	99	71	67	98	79	98	98

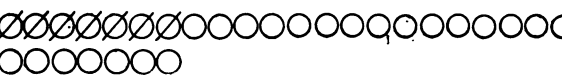
71. MISCELLANEOUS PROBLEMS.

1. George had 24 nails; he gave 4 to Henry and 4 to James. How many did he give away, and how many had he left?

Slate work:

24 nails, George has.	4 nails, gave to Henry.
8 nails, George gave away.	4 nails, gave to James.
16 nails, George had left.	8 nails, gave to both.

2. A watch cost $24, and a chain cost $8. How much more did the watch cost than the chain?



$24, cost of watch.
8, cost of chain.
$16, difference between cost of watch and chain.

The watch cost $16 more than the chain.

3. A kite cost 24 cents, and this is 8 cents more than the cost of a top. What was the cost of the top?

4. A picture costs 24 cents; Mary wishes to buy it, but has only 8 cents. How many more cents must she have to buy the picture?

Is there any difference between the number of cents Mary has, and the number of cents the picture costs? How do you find the difference?

Slate work:

24 cents, cost of picture.
8 cents, Mary has.
16 cents, difference between 24 cents and 8 cents.

The number of cents Mary needs to add to 8 cents to be able to buy the picture.

5. Margaret gathered 21 pond lilies: she gave 7 to Mamma, and took 7 to school to her teacher. How many had she left?

6. Grace wrote 11 lines in her copy-book on Monday, 7 on Tuesday, and 7 on Wednesday; how many lines did she write in all?

7. Grapes are selling at 3 pounds for 25 cents; what is that a pound?

8. One week a chairmaker made 31 parlor chairs and 8 office chairs. He sold 7 out of the whole number. How many had he left to sell?

9. A boy, having 50 cents, paid 9 cents for a ball; he afterwards found 8 cents; how many cents had he then?

10. Two rooms each rent for $12 a month, and two shops each rent for $9 a month; what is the rent of all for a month?

11. A hotel keeper bought 24 boxes of strawberries of one person and 6 of another; one third of the whole was used for breakfast; how many boxes were left?

12. Alfred bought a music box for 30 cents;

after mending it, he sold it for 9 cents more than it cost him. How much did he receive for it?

Slate work:

30 cents, cost of music box.
9 cents, gained by selling.
__ cents, money received for the box.

(Whenever there is any difficulty in understanding a problem, it should be pictured.)

The cost was how much less than the selling price?

The difference between the cost and the selling price was how many cents?

If the cost is 9 cents less than the selling price, how would you make it equal to the selling price?

Make problems for the following forms:

$31 + 9 = 40$. $41 - 2$. $51 + 8$. $69 - 2$.

72. ADDITION AND SUBTRACTION OF 2.

Make a table adding 2 to numbers ending in 2.

Add 3 and 4 to numbers ending in 2.

Subtract 2 from numbers ending in 2.

2	12	22	32	42	52	62	72	82	92
2	2	2	2	2	2	2	2	2	2

Take 2 from numbers ending in 3; what is the ending figure? 2 from numbers ending in 9?

11	21	31	41	51	61	71	81	91	101
2	2	2	2	2	2	2	2	2	2

What is the ending figure when you take 2 from numbers ending in 1?

Subtraction of 1 and 2 from numbers ending in any one of the digits.

(1)	10	11	22	33	44	55	66	77	88	99
	1	1	1	1	1	1	1	1	1	1
(2)	11	12	23	34	45	56	67	78	89	91
	2	2	2	2	2	2	2	2	2	2

Add 5 and 6 to numbers ending in 2.

Read the ending figure first, then the whole sum.

2	12	22	32	42	52	62	72	82	92	102
5	5	5	5	5	5	5	5	5	5	5
2	12	22	32	42	52	62	72	82	92	102
6	6	6	6	6	6	6	6	6	6	6

73. Slate Exercises, 2 + 5, 2 + 6, and Review.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
15	16	16	81	16	22	15	51	69	66
62	11	52	11	12	11	61	21	11	22
21	69	21	16	51	91	21	16	19	11
19	21	11	62	21	16	16	12	11	91
11	11	18	21	16	12	12	61	51	16
81	16	61	11	92	61	81	21	26	12
11	62	21	14	11	21	11	11	12	61
15	25	16	27	11	11	12	14	19	29
65	97	89	57	69	99	68	67	65	97
97	78	83	80	99	78	98	96	86	83

74. 7 + 2 AND 2 + 7.

2	12	22	32	42	52	62	72	82	92	102
7	7	7	7	7	7	7	7	7	7	7

Add:

2, 7, 1, 9, 1, 2, 7, 1, 1, 9, 2, 7, 1, 2, 7.
9, 8, 2, 1, 9, 1, 2, 7, 1, 2, 7, 1, 9, 1, 2, 7.
6, 6, 5, 2, 1, 2, 6, 1, 1, 2, 5, 2, 1, 2, 7.

Slate Exercises, 2 + 7 and 7 + 2, and Review.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
97	87	72	11	67	79	11	71	11	19
12	12	21	77	21	21	71	27	79	71
71	11	17	22	17	11	26	12	21	27
27	61	92	11	72	26	12	71	97	92
12	26	11	79	21	52	71	27	12	19
91	12	79	21	19	21	27	12	19	11
12	71	21	11	91	12	12	91	91	91
3	22	11	92	17	74	29	18	14	11
77	98	79	98	77	28	45	77	78	79
97	89	89	78	85	75	96	84	78	89

75. MISCELLANEOUS PROBLEMS.

1. Emma spent 5 cents for a watch-key, and had 42 cents left; how much money had she at first?

2. Alice paid 28 cents for a reader, $\frac{1}{4}$ as much for pencils, and $\frac{1}{7}$ as much for paper; how many cents did she spend?

3. A young man earned $9 a week, and spent $5 a week for board; how much did he save in 7 weeks?

4. On a journey of 3 days my expenses were $5, $7, and $6. When I started I had a 20-dollar bill. How much money had I when I returned?

5. A fruit dealer sells $\frac{1}{3}$ of a dozen oranges, and has 24 left; how many had he at first?

6. Mary made a wall-pocket, and sold it for 30 cents; this is more than it cost her; it is 9 cents more. What did it cost her?

Slate work:

30 cents, selling price.
9 cents, difference between cost and selling price.
— cents, cost.

30 cents is how much more than the cost? The cost is how much less than 30 cents?

7. A boy shot an arrow 39 feet up the road, and another 21 feet down the road; how far must he walk to get them? (Two answers.)

8. If a gallon of oil costs 30 cents, what is the cost of half a gallon? The cost of a quart?

9. George made a sled and sold it for 68 cents; this was 8 cents more than it cost him; how much did it cost?

76. WRITING NUMBERS.

HOW TO EXPRESS NUMBERS TO ONE THOUSAND.

Find with the counters 5 hundreds, 9 tens, and 9 ones. Add one *one*. How many hundreds have you?

Write in figures 6 hundreds. Write 6 hundreds, 4 tens; 6 hundreds, 5 tens, and 2 ones.

Find 7 hundreds. Write the number in figures.

Read:

643	611	721	505	707	606
751	610	712	689	770	660
589	601	702	799	777	666

Which is the greater number, 659 or 569? 697 or 769? 571 or 751?

Find 8 hundreds. Write the number in figures.

Find 8 hundreds, 8 tens, and 8 ones.

Find 9 hundreds, and represent the number by figures.

Find 9 hundreds, 9 tens, and 9 ones.

Read:

845	984	901	991	999	880
862	936	909	919	808	881
933	847	990	900	888	818

The greatest number that can be expressed by three figures is 999.

Add 1 to 999; how many hundreds have you? Ten hundreds make 1 thousand.

The number one thousand is expressed by writing the figure 1 in thousands' place, to the left of the hundreds.

Ten hundreds equal *one* thousand.

77. 8 + 2 AND 2 + 8.

Make a table, adding 2 to numbers ending in 8. Add 8 to numbers ending in 2.

Slate Exercises, 8 + 2 and 2 + 8, and Review.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
91	98	97	89	86	82	89	78	97	95
17	12	12	28	12	29	18	22	12	12
22	81	78	82	11	81	72	89	89	79
68	27	22	29	87	28	29	21	21	21
22	92	89	91	22	12	91	98	98	80
18	18	21	18	18	19	18	10	12	28
72	82	91	82	72	81	82	82	82	92
24	22	12	26	28	28	26	29	25	16
88	69	88	95	84	45	87	87	89	86
78	99	89	69	88	97	77	74	84	88

Add:

(11) 27, 62, 29, 81, 28, 12, 75, 27, 88, and 80.

(12) 68, 22, 89, 21, 98, 12, 80, 28, 63, and 99.

78. 9 + 2 AND 2 + 9.

2	12	22	32	42	52	62	72	82	92
9	9	9	9	9	9	9	9	9	9
9	19	29	39	49	59	69	79	89	99
2	2	2	2	2	2	2	2	2	2

Add:

9, 2, 8, 2, 1, 9, 1, 9, 1, 9, 1, 9, 1, 9, 8, 2.

6, 6, 9, 1, 9, 1, 9, 1, 6, 2, 2, 6, 1, 1, 7, 2.

9, 9, 2, 2, 9, 1, 9, 1, 9, 9, 2, 9, 9, 2, 2, 2.

8, 4, 9, 9, 2, 9, 1, 7, 2, 9, 2, 6, 2, 9, 2, 7.

Slate Exercises, 2 + 9 and 9 + 2, and Review.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
89	89	99	89	99	29	89	82	72	89
22	28	81	29	81	69	92	97	21	21
98	12	28	92	28	22	99	21	97	99
92	79	92	99	92	89	19	99	92	92
29	29	99	29	99	29	92	92	29	29
99	92	29	92	29	92	28	29	89	92
92	99	12	91	82	99	92	91	22	91
29	29	22	22	24	29	19	25	94	24
54	68	49	98	67	65	65	97	18	97
97	84	79	59	89	77	86	58	48	57

Add:

(11) 29, 79, 22, 98, 92, 29, 99, 92, 28, 99, and 43.

(12) 98, 82, 29, 99, 92, 29, 92, 96, 29, 64, and 80.

79. MISCELLANEOUS PROBLEMS.

1. John sold a knife to Edgar for 20 cents; this is less than John paid for it; it is 5 cents less. What did John pay for the knife?

Slate work:

20 cents, Edgar paid for the knife.
5 cents, difference between what John paid and what Edgar paid.
— cents, John paid for the knife.

Edgar paid 5 cents *less* than John. How much more did John pay than Edgar?

2. After buying 3 pounds of sugar at 9 cents a pound, I had 25 cents left; how much money had I at first?

3. In the morning session of school there are 3 hours, and in the afternoon session 2 hours; how many hours in a school week?

4. In a certain school there are 9 girls and 3 times as many boys; how many boys in the school, and how many boys and girls together?

5. In building his chicken house, John uses 72 shingles, and needs 7 more; how many should he have had at first?

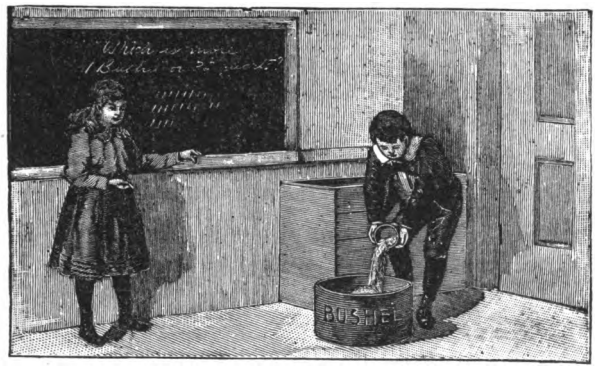
6. A peck of apples costs 30 cents; I must borrow 9 cents in order to pay for them; how much money have I? (Picture; compare 9 cents with 30 cents.)

7. Henry bought a pair of skates for 75 cents, and sold them for 8 cents less than he gave for them. For how much did he sell them?

8. How many feet of rope can I buy for 30 cents, if I pay 3 cents a foot? How many, if I pay 5 cents a foot?

9. If 2 pounds of figs cost 30 cents, what will a pound cost? What will $\frac{2}{3}$ of a pound cost?

10. In 30 lead pencils, how many packages of half a dozen?



CHAPTER III.

NUMBERS FROM THIRTY TO FORTY.

1. 32 cents are how many eight-cents?

○○○○○○○○
○○○○○○○○
○○○○○○○○
○○○○○○○○

$32 \div 8 = ?$

$4 \times 8 = ?$

8 is what part of 32?

I wish to put 32 qt. of milk into cans holding 8 qt. each; how many cans will be needed?

Divide 32 qt. of milk equally among 4 customers. How many quarts will each receive?

Make problems for:

) 32 cents in all.
4 cents, each receives.

) 32 cents.
4, 8-cents in 32 cents.

32 cents are how many four-cents? (Drawing.)

$32 \div 4 = ?$ $8 \times 4 = ?$ $\frac{1}{8}$ of $32 = ?$

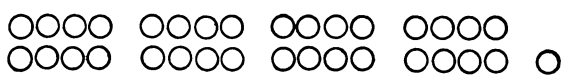
Make problems for:

$32 \div 4 = 8.$ $8 \times 4 = 32.$ $4 \times 8 = 32.$

$\frac{1}{4}$ of $32 = 8.$ $\frac{1}{8}$ of $32 = 4.$

Give the written work in answer to your problems.

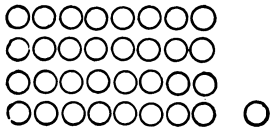
2. 33 cents are how many times 11 cents?
$33 \div 11 = ?$ $3 \times 11 = ?$ $\frac{1}{3}$ of $33 = ?$



$33 \div 4 = ?$ $8\frac{1}{4}$ fours are how many? $8\frac{1}{4} \times 4 = ?$

Frank is 33 miles from home. If he should walk at the rate of 4 miles an hour, how long would he be in walking the whole distance?

3. 33 equals how many 8's?



$33 \div 8 = ?$ $4\frac{1}{8} \times 8 = ?$ $4\frac{1}{8}$ eights are how many?

At 8 cents a pound, how many pounds of crackers can you buy for 33 cents?

Make problems for:

$33 \div 8 = 4\frac{1}{8}$. $4\frac{1}{8}$ times $8 = 33$. $\frac{1}{8}$ of $33 = ?$ $\frac{1}{4}$ of $33 = ?$

Pack 33 qt. of ice-cream in 4 cans of equal size. How many quarts will each can contain?

4. REVIEW.

$4 \times 8 = ?$	$4\frac{1}{8} \times 8 = ?$	$32 \div 4 = ?$	$\frac{1}{11}$ of $33 = ?$
$3 \times 10\frac{1}{3} = ?$	$3 \times 11 = ?$	$33 \div 11 = ?$	$\frac{1}{4}$ of $32 = ?$
$4 \times 7\frac{3}{4} = ?$	$6 \times 5\frac{1}{6} = ?$	$31 \div 3 = ?$	$\frac{1}{4}$ of $33 = ?$
$2 \times 16 = ?$	$8\frac{1}{4} \times 4 = ?$	$33 \div 4 = ?$	$\frac{1}{8}$ of $31 = ?$

A freight train is moving at the rate of 10 miles an hour. At that rate, how long will it be in going 31 miles?

What will $8\frac{1}{4}$ yd. of silk cost, at \$4 a yard?

33 pounds of honey were packed in 8 jars of equal size; how many pounds in each jar?

Make problems for these forms:

$31 \div 3 = 10\frac{1}{3}$. $31 \div 2 = 15\frac{1}{2}$. $\frac{1}{3}$ of $31 = 10\frac{1}{3}$.
$\frac{1}{2}$ of $31 = 15\frac{1}{2}$. $33 \div 4 = 8\frac{1}{4}$. $\frac{1}{4}$ of $33 = 8\frac{1}{4}$.

Give the written work for your problems.

5. 35 is how many sevens? Draw 35 circles upon your slate to represent cents; divide them into 7's.

$35 \div 7 = ?$ $5 \times 7 = ?$ $\frac{1}{5}$ of $35 = ?$ 7 is what part of 35?

Draw 35 cents, and divide them into 5's.

$35 \div 5 = ?$ $7 \times 5 = ?$ $\frac{1}{7}$ of $35 = ?$

Make a problem for: $\frac{1}{7}$ of $35 = 5$. $35 \div 7 = 5$.

\$5 is $\frac{1}{7}$ of my money; how much money have I? Seven times $\frac{1}{7}$ are how many sevenths?

$\frac{1}{5}$ of $35 + \frac{1}{7}$ of $35 = ?$ $35 - \frac{1}{5}$ of $35 = ?$ $35 - \frac{1}{7}$ of $35 = ?$

6. REVIEW.

$34 \div 2 = ?$	$34 \div 4 = ?$	$8 \times 4\frac{1}{4} = ?$	$\frac{1}{4}$ of $34 = ?$
$34 \div 3 = ?$	$7 \times 5 = ?$	$2 \times 17 = ?$	$\frac{1}{5}$ of $35 = ?$
$35 \div 7 = ?$	$3 \times 11\frac{1}{3} = ?$	$\frac{1}{7}$ of $35 = ?$	$4 \times 8\frac{1}{2} = ?$

Ella counted 7 red leaves on each of 5 branches of a maple tree; how many leaves did she count?

A shoe merchant sold 8 pairs of shoes for $34; how much was that a pair?

John planted 35 currant bushes, planting 7 in a row; how many rows were there?

Robert raised 35 pumpkins, and sold $\frac{2}{7}$ of them; how many had he left?

7. Draw 36 triangles and divide them into twelves.

36 equals how many 12's? $36 \div 12 = ?$ $3 \times 12 = ?$

12 is what part of 36? $\frac{1}{3}$ of $36 = ?$

Give 36 roses to mother, May, and Grace. How many will each receive if you divide them equally?

Draw 36 triangles, and divide them into threes.

36 equals how many 3's? $36 \div 3 = ?$ $12 \times 3 = ?$

3 is what part of 36? $\frac{1}{12}$ of $36 = ?$

How many 3-cents in 36 cents?

Draw 36 melon seeds; divide them into nines.

36 equals how many 9's? $36 \div 9 = ?$ $4 \times 9 = ?$

9 is what part of 36? $36 - \frac{1}{4}$ of $36 = ?$

18 is how many fourths of 36? $9 is $\frac{1}{4}$ of my money; how much money have I? 4 nines are how many ones?

Draw 36 seeds, and divide them into fours.

$36 \div 4 = ?$ $9 \times 4 = ?$ $\frac{1}{3}$ of $36 = ?$

If I use 4 pounds of butter a week, how many pounds shall I use in 9 weeks?

Make problems for:

$36 \div 4 = 9.$ $\frac{1}{9}$ of $36 = 4.$ $36 \div 9 = 4.$

Divide 36 nails into 6 equal groups. $36 \div 6 = ?$ $6 \times 6 = ?$

6 is what part of 36? At 6 cents each, how many papers of needles can you buy for 36 cents?

8. Divide 37 shells into twelves:

37 is how many 12's? $37 \div 12 = ?$ $3\frac{1}{12} \times 12 = ?$

At 12 cents a quart, how many quarts of cranberries can you get for 37 cents?

Divide 37 peaches equally among 3 boys. How many will each receive? (Drawing.)

Make problems for:

$3\frac{1}{12} \times 12 = 37.$ $37 \div 12 = 3\frac{1}{12}.$ $\frac{1}{3}$ of $37 = 12\frac{1}{3}.$

9. Divide 37 shells into threes:

37 is how many 3's? $37 \div 3 = ?$ $12\frac{1}{3} \times 3 = ?$ $\frac{1}{12}$ of $37 = ?$

At \$3 a box, how many boxes of oranges can be bought for \$37?

$\frac{1}{12}$ of 37 loaves of bread is how many loaves?

Find $\frac{1}{4}$ of 37 inches of lead pipe, $\frac{1}{5}$ of 37 gallons of oil, $\frac{1}{8}$ of 37 pounds of corn meal.

At 6 cents a pound, how many pounds of hominy can you buy for 37 cents? At $5 each, how many writing desks can be bought for $37?

10. REVIEW.

$12 \times 3 = ?$	$3\frac{1}{12} \times 12 = ?$	$36 \div 3 = ?$	$\frac{1}{3}$ of $36 = ?$
$9 \times 4 = ?$	$6 \times 6\frac{1}{6} = ?$	$36 \div 9 = ?$	$\frac{1}{9}$ of $37 = ?$
$6 \times 6 = ?$	$12 \times 3\frac{1}{12} = ?$	$37 \div 4 = ?$	$\frac{1}{4}$ of $36 = ?$
$4 \times 9 = ?$	$4 \times 9\frac{1}{4} = ?$	$37 \div 3 = ?$	$\frac{1}{4}$ of $37 = ?$

1. Alice has 36 cents to spend for flowers. If she spends 12 cents for each plant, how many can she buy?

2. Give 36 pinks to 6 children. How many will each receive, if you divide them equally?

3. At 12 cents a yard, how many yards of oil-cloth can you buy for 37 cents?

4. Horace says: "Four times my age is my father's age." How old is his father, if Horace is 9 years old?

5. If I put 12 candles on each of 3 birthday cakes, how many candles shall I use?

6. Find $\frac{1}{4}$ of 37 ears of corn; $\frac{1}{5}$ of 37 heads of cabbage.

7. Make problems for these forms, about things found in the forest:

$36 \div 4 = 9.$ $9 \times 4 = 36.$ $36 \div 12 = 3.$ $36 \div 9 = 4.$

8. Make problems for the following forms and give the written work in answer:

$6 \times 6 = 36$. $6 \times 6\frac{1}{6} = 37$. $\frac{1}{4}$ of $37 = 9\frac{1}{4}$. $37 \div 4 = 9\frac{1}{4}$

11. 40 is how many tens? $40 \div 10 = ?$ $4 \times 10 = ?$ $\frac{1}{4}$ of $40 = ?$

40 is how many fours? $40 \div 4 = ?$ $10 \times 4 = ?$ $\frac{1}{10}$ of $40 = ?$

Make problems for:

$40 \div 4 = 10$. $40 \div 10 = 4$. $10 \times 4 = 40$.

40 is how many eights?

Make a drawing to show this. Draw leaves of some plant.

$40 \div 8 = ?$ $5 \times 8 = ?$ 8 is what part of 40?

At Christmas, 40 pounds of candy were divided among 5 schools; how many pounds did each school receive?

40 is how many fives? $40 \div 5 = ?$ $8 \times 5 = ?$

At 5 cents a loaf, how many loaves of bread can you get for 40 cents?

12. REVIEW.

$\frac{1}{2}$ of $38 = ?$	$\frac{1}{5}$ of $40 = ?$	$4 \times 9\frac{3}{4} = ?$	$40 \div 8 = ?$
$\frac{1}{3}$ of $39 = ?$	$\frac{1}{8}$ of $38 = ?$	$6 \times 6\frac{1}{2} = ?$	$38 \div 4 = ?$
$\frac{1}{4}$ of $38 = ?$	$\frac{1}{8}$ of $40 = ?$	$6 \times 6\frac{1}{3} = ?$	$39 \div 6 = ?$
$\frac{1}{6}$ of $39 = ?$	$8 \times 5 = ?$	$4 \times 9\frac{1}{2} = ?$	$38 \div 3 = ?$

1. Mary had 40 cents. She spent $\frac{1}{4}$ of it for paper, $\frac{1}{4}$ for a thimble, and $\frac{1}{4}$ for a bunch of violets. How much money had she left?

2. If 39 gallons of coal-oil are used in 4 months, how many gallons at that rate will be used in 1 month?

3. 38 pounds of rice lasted a camping party 9 weeks; how many pounds was that a week?

4. How many hours will it take Albert to hoe 40 rows of corn, if he hoes 5 rows in an hour?

5. Divide 40 sheets of drawing paper equally between two classes of a school.

6. Make problems for these forms:

$\frac{1}{8}$ of $40 = 8$. $40 \div 8 = 5$. $\frac{1}{2}$ of $38 = 9\frac{1}{2}$. $\frac{1}{4}$ of $39 = 9\frac{3}{4}$

$38 \div 3 = 12\frac{2}{3}$. $6 \times 6\frac{1}{3} = 38$. $2 \times 19 = 38$. $3 \times 13 = 39$.

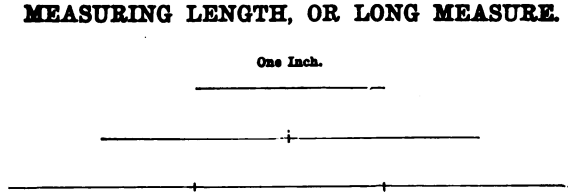
13. Copy and learn:

$1 \times 2 = 2$	$1 \times 3 = 3$	$1 \times 4 = 4$
$2 \times 2 = 4$	$2 \times 3 = 6$	$2 \times 4 = 8$
$3 \times 2 = 6$	$3 \times 3 = 9$	$3 \times 4 = 12$
$4 \times 2 = 8$	$4 \times 3 = 12$	$4 \times 4 = 16$
$5 \times 2 = 10$	$5 \times 3 = 15$	$5 \times 4 = 20$
$6 \times 2 = 12$	$6 \times 3 = 18$	$6 \times 4 = 24$
$7 \times 2 = 14$	$7 \times 3 = 21$	$7 \times 4 = 28$
$8 \times 2 = 16$	$8 \times 3 = 24$	$8 \times 4 = 32$
$9 \times 2 = 18$	$9 \times 3 = 27$	$9 \times 4 = 36$
$10 \times 2 = 20$	$10 \times 3 = 30$	$10 \times 4 = 40$
$11 \times 2 = 22$	$11 \times 3 = 33$	
$12 \times 2 = 24$	$12 \times 3 = 36$	

14. REVIEW.

MEASURING LENGTH, OR LONG MEASURE.

One Inch.



What is the length of the first line? Of the second? The length of the first line is what part of the length of the second?

The second line is what part of the third?

Cut a piece of paper 12 inches long and 1 inch wide. Draw a line 12 inches long.

12 inches make a measure that is called one (?).

How many six-inch sticks of candy can you cut from a stick 12 inches long? How many 3-inch sticks? 3 inches are what part of a foot?

How many 4-inch lead pencils can be made from a piece of lead 12 inches long? 4 inches are what part of a foot? 5 inches? One inch?

How many feet in fifteen inches? In eighteen?

Draw a line 3 feet long? *Three feet make one yard.* Mention some things that are sold by the yard. How many inches in one yard? 1 foot is what part of a yard?

15. ½ a yard is how many inches? How many feet?

$\frac{1}{4}$ of a yard is how many inches? $\frac{1}{8}$ of a yard?

12 inches are what part of a yard? $4\frac{1}{2}$ inches?

Ella has a yard of silk with which to dress 4 dolls for the fair. What part of the silk shall she use for each dress, if she divides it equally? How many inches for each?

If a yard of ribbon is divided for badges equally among 8 boys, what will be the length of each piece?

In 2 yards how many feet? In 3 yards? How many half yards in 2 yards? How many in 3 yards?

16. How many feet tall are you? What is the height of the teacher's table from the floor? (Estimate first, and then measure.) What is the length of the table? How far from the top of your desk to the floor? Height of the transom from the floor? Width of window sash? Height of clock from the floor? Length, in feet, of front blackboard? Length of room? Width of room? Tie a knot for every foot in a piece of twine 6 feet long. Tie a double knot for every yard.

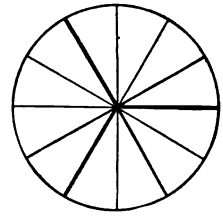
Estimate length, width, and height of things outside of schoolroom, and then measure: height of a barrel; of a common wooden bucket; length of an ear of corn.

12 inches (in.) = 1 foot (ft.).
3 feet = 1 yard (yd.).

In measuring goods sold by the *yard*, the yard is divided into *halves, fourths, eighths,* and *sixteenths.*

$2\frac{1}{4}$ inches	= 1 sixteenth ($\frac{1}{16}$ yd.).
2 sixteenths ($4\frac{1}{2}$ in.)	= 1 eighth ($\frac{1}{8}$ yd.).
2 eighths (9 in.)	= 1 quarter ($\frac{1}{4}$ yd.).
4 quarters	= 1 yard (1 yd.).

17. Comparison of the fractions *one half, one third, one fourth,* and *one sixth.*



Into how many equal parts is this circle divided ?

One of the twelve equal parts of anything is called what ? One half of the circle is how many of these parts ? One third of the circle is how many *twelfths* of the whole circle ? $\frac{1}{4}$ is how many twelfths ? $\frac{1}{6}$ is how many twelfths ?

Which is more, $\frac{1}{3}$ of a cake or $\frac{1}{4}$? $\frac{1}{3}$ or $\frac{1}{2}$?

Look at the circle and find the answers to these questions (or cut a circle from paper, fold it into *halves,* then into *sixths,* then into *twelfths*).

$\frac{1}{3}$ and $\frac{1}{6}$ are how many twelfths ? $\frac{1}{3}$ and $\frac{1}{4}$ are how many twelfths ?

$\frac{1}{6} + \frac{1}{4} = ?$	$\frac{2}{6} + \frac{1}{3} = ?$	$\frac{5}{6} + \frac{2}{12} = ?$	$\frac{12}{12} - \frac{2}{12} = ?$
$\frac{1}{2} + \frac{1}{6} = ?$	$\frac{1}{2} + \frac{1}{3} = ?$	$\frac{2}{3} + \frac{2}{12} = ?$	$1 - \frac{2}{12} = ?$
$\frac{1}{3} + \frac{1}{12} = ?$	$\frac{3}{4} + \frac{1}{3} = ?$	$\frac{6}{6} - \frac{1}{12} = ?$	$1 - \frac{3}{4} = ?$

18. Alice cut out $\frac{1}{3}$ of a cake to take to a picnic; her mother used $\frac{1}{2}$ of the cake for tea. What part of the whole cake was left?

Edgar used $\frac{1}{4}$ of a ball of twine, and his brother Carl used $\frac{1}{3}$ of the ball; what part of the whole ball was left?

Look at the circle, or draw a circle, and find answers:

$\frac{2}{12}$ = how many sixths? Find $\frac{1}{3}$ of $\frac{1}{4}$ of the circle.

$\frac{3}{12}$ = how many fourths? $\frac{1}{3}$ of $\frac{1}{4}$ is what part of the whole?

$\frac{6}{12}$ = how many halves? $\frac{1}{2}$ of $\frac{1}{6}$ is what part of the whole?

$\frac{9}{12}$ = how many fourths? $\frac{1}{6}$ of $\frac{10}{12}$ = ? $\frac{1}{3}$ of $\frac{6}{12}$ = ?

$\frac{10}{12}$ = how many sixths? $\frac{1}{4}$ of $\frac{1}{3}$ = ? $\frac{1}{3}$ of $\frac{1}{2}$ = ?

19. $\frac{1}{12}$ is found in $\frac{6}{12}$ how many times? $\frac{10}{12}$ contains $\frac{2}{12}$ how many times? $\frac{8}{12}$ contains $\frac{4}{12}$ how many times?

2 times $\frac{4}{4}$ are how many wholes? 4 times $\frac{2}{4}$ are how many wholes?

3 × $\frac{6}{12}$ are how many twelfths? How many wholes?

4 × $\frac{2}{4}$ are how many wholes? 4 × $\frac{3}{4}$ = ?

Which of these forms is most used: $\frac{10}{12}$ or $\frac{5}{6}$? $\frac{9}{12}$ or $\frac{3}{4}$?

20. DRY MEASURE.

A quart of berries is how many pints?

A peck of beans is how many quarts?

Eight quarts make a peck.

Where have you seen these measures used? Name some things which you have seen measured by them.

Half a peck of nuts is how many quarts?

$\frac{1}{4}$ of a peck is how many quarts?

4 quarts of berries are what part of a peck?

6 quarts are what part of a peck?

$\frac{3}{4}$ of a peck of oats are how many quarts?

John sowed $\frac{3}{4}$ of a peck of blue-grass seed; how many quarts were left out of a peck?

Four pecks make a bushel.

21. $\frac{1}{2}$ a bushel of potatoes is how many pecks?

$\frac{3}{4}$ of a bushel are how many pecks?

Half a bushel of cranberries is how many quarts?

Two bushels are how many pecks?

Estimate the capacity of a box or basket brought into the schoolroom.

$1\frac{1}{2}$ bushels of walnuts are how many pecks?

Henry gathered a bushel of beans from his garden, and sold half of them for 25 cents a peck. How much money did he receive?

Grains, fruits, vegetables, and some other things that are not liquids, are sold by these measures. This is called *Dry Measure.*

2 pints (pt.) = 1 quart (qt.).
8 quarts = 1 peck (pk.).
4 pecks = 1 bushel (bu.).

22. MISCELLANEOUS PROBLEMS.

1. How many feet in a yard? How many inches in a yard? $\frac{1}{3}$ of a yard is how many inches? How many feet?

2. Early in the spring I found a little flower called the wake-robin; each one had 3 petals; eleven such flowers have how many petals?

3. We have a measure which holds just 8 quarts; what is the measure called? Shell a peck of corn; how many quarts have you?

4. A party of boys went nutting and gathered $2\frac{1}{4}$ pecks of nuts; how many quarts is that?

5. 32 quarts of strawberries are how many gallons?

6. At 9 cents a yard, how many yards of muslin can you buy for 38 cents?

7. How many spools of thread can I buy for 35 cents, at 5 cents a spool? How many at 4 cents a spool? How many cents remaining?

8. $\frac{1}{8}$ of 24 acres of land is planted in sugar-corn, $\frac{1}{12}$ in potatoes, $\frac{1}{6}$ in oats, and the remainder in meadow; how many acres in meadow?

9. A man is rowing down the river 8 miles an hour; at that rate how long will he be in going 34 miles?

10. At 4 cents a pound, how many pounds of oatmeal can you get for 39 cents?

11. Give 3 pecks of corn to four horses, dividing it equally; what part of the 3 pecks will each receive?

12. How many quarts in 5 pecks?

A common wooden bucket holds how many pecks?

Such questions have very little meaning unless the measures have been used by pupils until they have some idea of their comparative size and value.

23. ADDITION AND SUBTRACTION OF 3.

Make a table, adding 3 to numbers ending in 3. What is the ending figure of each sum?

Add 3 to numbers ending in 4.

Subtract 3 from numbers ending in 3; from numbers ending in 4.

Add 3 to numbers ending in 5. What is the ending figure?

$53 + 3 = ?$ $64 + 3 = ?$ $73 - 3 = ?$ $84 - 3 = ?$

5 + 3 AND 3 + 5.

Add:

5,	3,	2,	5,	3,	2,	5,	3,	2,	3,	5,	2,	5,	3,	2.
9,	6,	3,	2,	3,	5,	1,	2,	2,	5,	2,	5,	3,	2,	5.
8,	7,	3,	2,	5,	3,	1,	2,	4,	3,	2,	3,	5,	1,	2.

Add:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
95	39	53	23	85	99	29	82	55	59
23	92	39	19	23	92	89	95	22	39
59	15	99	51	99	29	22	23	92	92
31	23	92	32	91	91	12	29	92	92
92	52	29	95	22	12	55	59	23	25
95	35	91	13	95	25	33	32	94	23
23	93	12	21	13	53	12	92	10	59
22	24	25	32	24	38	23	24	24	39
59	68	57	48	58	64	57	56	57	54
99	98	86	79	98	98	78	98	79	98

Make a table, subtracting 3 from numbers ending in 2; from numbers ending in one.

Make problems for these forms:

$$32 - 3 = 29. \qquad 41 - 3 = 38.$$

24. 6 + 3 AND 3 + 6.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
66	36	89	38	52	99	26	69	29	96
33	83	22	99	31	21	63	92	62	29
91	29	66	92	16	66	39	26	36	62
26	92	33	26	63	33	92	63	93	36
63	26	99	13	31	99	23	39	29	93
39	63	29	69	96	22	36	92	32	29
92	32	62	32	23	67	56	99	68	69
26	93	36	96	32	36	27	23	27	36
67	97	55	95	59	67	67	68	67	58
96	88	99	78	79	99	90	89	67	98

25. 7 + 3 AND 3 + 7.

Make a table, adding 7 to numbers ending in 3.

Add:

9, 9, 2, 3, 7, 2, 9, 9, 3, 7, 3, 6, 2, 9, 3, 7.
6, 6, 7, 2, 9, 3, 7, 2, 9, 9, 3, 7, 2, 9, 9, 5.
9, 7, 4, 3, 7, 2, 9, 9, 3, 6, 2, 9, 3, 7, 2, 9.
8, 7, 5, 2, 9, 9, 3, 7, 3, 6, 2, 9, 3, 5, 2, 3, 7.

3 + 7, AND REVIEW.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
69	99	99	92	99	62	29	96	73	78
32	79	22	26	99	36	90	73	37	32
76	32	56	73	29	73	22	39	93	97
33	96	33	39	82	30	68	19	99	93
77	24	99	99	27	99	32	92	20	29
33	97	29	22	73	9	77	97	9	72
99	73	62	63	30	92	33	23	72	36
9	32	37	38	65	23	92	57	38	95
96	89	74	79	6	98	99	7	65	98
66	69	79	80	99	69	79	96	97	70

26. MISCELLANEOUS PROBLEMS.

1. A man paid $72 for a wagon and $8 for repairs, then sold it at a loss of $9; how much did he receive for it?

2. Three men bought a horse: the first man paying $36, the second man $15, and the third man as much as the first two; how much did the horse cost?

3. If I buy 11 yards of velvet at $3 a yard, and sell it at $4 a yard, how much shall I gain?

4. If a boy earns $12 a week and spends $7, how much will he save in 8 weeks?

5. Willie gathered a bushel of chestnuts: he gave his brother 10 quarts, kept 6 quarts, and sold the remainder; how many quarts did he sell?

6. When Alfred reads 8 pages more he will have finished his story book, which contains 90 pages; how many pages has he read?

7. A man gave a watch and $10 in money for a horse worth $75; what is the value of the watch?

8. Two persons start from the same point and travel in opposite directions: one travels 26 miles and the other 38 miles; how far apart are they?

9. A man saved 24 dollars one month, half as much the next month, and 6 dollars the third month; how much money had he saved at the end of the three months?

10. If 82 feet of wire are already used in making a fence, and 9 feet more are needed, how much wire will be used?

11. James shoots an arrow which does not reach the mark by 9 feet. If the mark is 51 feet away, how far is the arrow from James? (Drawing.)

27. 8 + 3 AND 3 + 8.

Make a table, adding 8 to numbers ending in 3.

Add:

6, 7, 8, 2, 8, 9, 3, 8, 9, 3, 8, 9, 3, 8, 9.
9, 9, 3, 9, 3, 8, 9, 2, 9, 9, 3, 8, 9, 0, 9.
7, 4, 9, 3, 8, 9, 3, 8, 9, 2, 9, 9, 0, 3, 7.
9, 8, 3, 3, 7, 3, 8, 9, 2, 9, 9, 3, 7, 3, 8.

Add:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
82	30	93	89	88	59	93	7	89	90
39	99	99	32	33	32	99	87	32	23
93	8	89	76	97	99	29	33	9	69
87	83	32	33	83	98	72	79	78	8
39	37	99	7	39	23	37	28	33	33
72	93	98	93	78	97	93	82	97	79
29	99	23	89	33	83	89	32	83	33
8	23	94	38	99	36	38	93	33	99
86	59	89	65	94	57	56	88	58	89
77	99	77	88	67	97	97	88	99	80

Add:

(11) 99, 78, 33, 97, 93, 29, 98, 83, 38, 44, and 98.

(12) 88, 33, 99, 89, 32, 99, 92, 28, 98, 84, and 69.

Find the sum of:

(13) 93, 35, 33, 53, 94, 39, 43, 43, 77, and 98.

(14) 62 + 39 + 89 + 23 + 93 + 35 + 43 + 43 + 87 + 77 = what?

28. 9 + 3 AND 3 + 9.

3	13	23	33	43	53	63	73	83	93
9	9	9	9	9	9	7	9	9	9

9	19	29	39	49	59	69	79	89	99
3	3	3	3	3	3	3	3	3	3

Add:

9, 4, 9, 8, 2, 9, 9, 3, 9, 8, 3, 8, 9, 9, 1.
9, 9, 3, 9, 3, 9, 9, 9, 3, 9, 8, 3, 9, 9, 9.
8, 5, 9, 9, 9, 3, 7, 3, 8, 9, 3, 9, 8, 0, 9.
8, 9, 3, 3, 7, 3, 8, 9, 3, 9, 7, 2, 9, 9, 2.

$51 + 9 = ?$ $62 + 7 = ?$ $72 - 3 = ?$ $70 - 2 = ?$
$72 + 6 = ?$ $73 + 7 = ?$ $91 - 2 = ?$ $90 - 1 = ?$
$81 + 8 = ?$ $92 + 8 = ?$ $81 - 3 = ?$ $80 - 3 = ?$
$83 + 9 = ?$ $83 + 5 = ?$ $32 - 3 = ?$ $91 - 3 = ?$

29. 3 + 9 AND 9 + 3, AND REVIEW.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
99	99	89	99	89	99	90	8	88	97
93	38	39	39	93	99	39	39	93	99
30	93	93	79	39	39	99	83	99	33
78	77	99	33	98	93	93	99	39	99
99	30	98	99	93	89	29	39	99	89
33	89	33	98	97	38	99	92	83	32
9	93	9	93	33	93	82	89	37	86
99	8	83	37	93	24	37	35	6	90
96	33	99	54	98	67	55	86	57	6
66	59	69	89	69	69	98	60	90	78

Add:

(11) 98, 89, 33, 79, 39, 80, 9, 92, 38, 98, and 54.

(12) 99, 20, 83, 97, 33, 99, 8, 83, 34, 78, and 78.

Find the sum of:

(13) 3, 35, 39, 53, 94, 34, 49, 43, 89, and 79.

(14) $95 + 39 + 33 + 45 + 83 + 39 + 63 + 34 + 97 + 67 =$ what ?

30. UNITED STATES MONEY.

Draw the one-cent piece upon your slate. Draw the dime. How many cents equal a dime?

How many cents make a dollar?

How many tens make *one* hundred? How many dimes make a dollar? One dollar is written, $1.

10 cents = 1 dime.

10 dimes = $1.

Half a dollar is how many cents? 50 is what part of 100? 50 cents is what part of $1?

25 cents are what part of 100 cents? What part of $1? What part of 50 cents? $\frac{1}{4}$ of $1 is how many cents?

$\frac{3}{4}$ of $1 are how many cents? $\frac{1}{2}$ of $1 is how many cents?

$\frac{1}{2}$ of \$1 is how many dimes? $\frac{1}{4}$ of \$1 is how many dimes? Half a dime is how many cents?

I have two pieces of money which make a half-dime; what are they?

What 3 kinds of coins can you select to make a dime in value?

If I spend $\frac{1}{4}$ of \$1, how many fourths shall I have left? How many cents?

Find with the counters (buttons or button molds) 100 cents; find 5 more cents. How many cents have you? How many dollars and cents?

To show that we have one dollar and five cents, we write it in this way: \$1.05, placing a period between dollars and cents.

Write one dollar and three cents; one dollar and six cents.

The cents are written at the right of the dollars, with a period between the dollars and cents. Two places are required to express cents when the dollar sign is used.

31. Begin with \$1, and write all the dollars and cents up to \$1.25.

Write the following in figures:

One dollar fifty cents; one dollar and sixty-nine cents; one dollar one cent; one dollar and ninety-nine cents

Read the following:

(1)	(2)	(3)	(4)	(5)
$0.06	$1.02	$1.10	$1.70	$0.03
$1.00	$1.09	$1.01	$1.71	$1.44
$1.07	$1.90	$1.75	$1.17	$1.50
$1.88	$1.17	$0.98	$1.27	$1.80
$1.11	$1.60	$1.36	$1.05	$1.08

Write the above numbers and add.

Add as in simple numbers, and separate dollars from cents by a period.

How many cents in $2? In $3? In $4?

Write the following in figures:

Two dollars seven cents; two dollars twelve cents; three dollars forty cents; four dollars ninety cents; five dollars nine cents; seven dollars seven cents.

32. Read the following:

$6.08	$0.01	$5.05	$6.15	$7.71	$20.05
$9.10	$8.01	$4.01	$6.51	$7.07	$30.50
$7.05	$9.09	$3.10	$0.05	$10.50	$29.16
$4.04	$5.50	$6.11	$7.17	$10.05	$40.12

How many cents in two dollars ninety-five cents?

How many dollars in six hundred fifty cents?

How many hundreds in seven hundred ninety?

How many 50's in 200?

How many 50-cent pieces in $2.

Put down a dollar for each hundred cents in ten dollars. How many hundred cents make ten dollars?

How many cents make seven dollars seven cents?

1. Find the sum of $9.06 and $12.20.
2. Find the sum of $15.25 and $4.30.

3. $12.00 — $5.00.
4. $15.50 — $12.50.
5. $20.00 — $6.00.
6. $9.30 — $8.30.

33. MISCELLANEOUS PROBLEMS.

1. A boy earned $1.65, and his father gave him 35 cents; he paid 50 cents for a scrapbook, and 50 cents for pictures; how much money had he left?

2. Bought 10 yards of cloth at 4 dollars a yard, and lost $8 in selling it; how much did I get for it?

3. A boy earned 75 cents a day, and paid 50 cents a day for his board; how much had he left at the end of 6 days?

4. Max has a quarter of a dollar, a dime, a 3-cent piece, and a 2-cent piece; how much money has he? James has $\frac{1}{4}$ as much money as Max; how much has he?

5. We paid for a Christmas tree, $2; for tapers, 40 cents; for candy, 75 cents; for netting for candy bags, 10 cents; for toys, $1.20; for books, $3.60; what did all cost?

6. How many yards of fringe will be needed for a rug 5 ft. long and 3 ft. wide? (Drawing.)

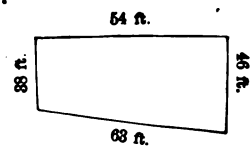
7. A class of children made 69 holly wreaths to trim a schoolroom, and used all but 3; how many did they use?

8. If $\frac{1}{4}$ of a yard of ribbon costs 2 cents, how many yards can I buy for 32 cents?

9. A man bought 3 dozen boxes of peaches, but found $\frac{1}{12}$ of them unsound; how many boxes were sound?

10. Mary's aunt gave her a doll for which she paid \$4; for the doll's house she bought a set of chairs for which she paid \$1.50, a sofa for \$1, a bedstead for \$1.20, and a little bureau for 90 cents; what did all cost?

11. How many feet must a boy walk in going around this lot?



34. REVIEW.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
93	62	22	99	96	69	93	33
35	39	49	29	33	29	33	33
33	89	39	63	39	32	34	45
53	23	28	35	52	56	53	99
94	93	33	93	96	93	92	23
39	35	39	39	33	39	35	64
43	43	32	42	49	43	49	34
43	43	93	43	43	43	43	93
77	87	87	88	89	87	99	98
98	77	79	78	79	78	69	79

(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
89	29	93	26	97	32	23	23
79	63	94	33	29	96	64	56
38	34	34	68	63	23	94	39
93	84	68	89	35	39	29	23
37	28	22	21	93	63	63	65
43	92	99	99	29	25	35	23
43	89	83	83	62	43	93	83
93	33	33	33	33	43	38	23
98	79	87	89	88	99	76	87
76	79	78	76	78	68	66	87

(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
73	62	36	98	29	82	98	96
26	26	68	32	39	99	99	99
29	53	92	39	62	39	39	33
63	37	39	58	72	42	42	65
95	93	43	93	34	49	49	23
23	39	45	39	94	99	78	89
62	42	83	42	89	83	33	22
34	41	28	43	33	33	93	93
95	89	98	77	79	79	88	97
79	79	64	79	79	76	79	79

35. SUBTRACTION.

Subtract 2 and 3 from numbers ending in any one of the digits. Give the ending figure of each result first, then the whole remainder.

(1)	11	12	23	34	45	56	67	78	89	91
	2	2	2	2	2	2	2	2	2	2
(2)	10	21	32	43	54	65	76	87	98	99
	3	3	3	3	3	3	3	3	3	3

(3) 21 42 51 43 61 72 81 62 91 101
2 3 2 3 3 3 2 3 2 3

160 − 3? (60 − 3 = 57. 160 − 3 = 157.)

161 − 42 = ?

42 names the part of 161 which we wish to take out of that number.

Write *ones* under ones, *tens* under tens. (Place the bundles of sticks, 1 hundred, 6 tens, 1 one, over the figures 161.)

5 10
1 ϕ 1
4 2
1 1 9

Subtract *ones* first. 2 ones cannot be taken out of 1 one. Take 1 ten from the tens, leaving 5 tens. (Show with the sticks.)

The 1 ten which we have taken is equal to 10 ones, which we add to the 1 one to make 11 ones. 2 ones from 11 ones leaves 9 ones, which is written in ones' place below the line. 4 tens from 5 tens leaves 1 ten, which is written in tens' place below the line. No hundreds from 1 hundred leaves 1 hundred.

119 is the part of 161 which we wished to find. The two parts make what number?

Taking a part of a number out of it, to find the remainder is called Subtraction.

The number to be diminished by taking one of the parts is called the Minuend.

The part taken out of the minuend is called the Subtrahend: the part left is called the Remainder.

The sign of Subtraction (−) is called *minus* or *less*. 14 − 6 = 8, is read, 14 *minus* 6 equals 8: it means that 14 made 6 less is equal to 8.

36. Subtract:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
160	251	261	252	252	263	141	230
42	22	32	33	42	34	22	24
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
231	130	241	142	240	331	212	161
23	22	23	33	22	14	34	33

(17) $184-45=?$	(18) $153-35=?$	(19) $174-146=?$	(20) $183-156=?$
(21) $168-59=?$	(22) $173-49=?$	(23) $163-138=?$	(24) $177-148=?$
(25) $140-23=?$	(26) $165-48=?$	(27) $192-147=?$	(28) $190-137=?$
(29) $156-39=?$	(30) $182-55=?$	(31) $180-168=?$	(32) $180-146=?$
(33) $191-44=?$	(34) $194-58=?$	(35) $162-136=?$	(36) $161-138=?$
(37) $165-59=?$	(38) $161-45=?$	(39) $183-157=?$	(40) $190-129=?$
(41) $140-24=?$	(42) $162-39=?$	(43) $192-168=?$	(44) $187-158=?$
(45) $181-67=?$	(46) $191-69=?$	(47) $171-136=?$	(48) $188-179=?$
(49) $194-69=?$	(50) $180-45=?$	(51) $195-147=?$	(52) $135-48=?$

(53)	(54)	(55)	(56)	(57)	(58)	(59)	(60)	(61)
164	125	130	120	191	128	191	106	104
58	36	39	49	83	69	94	37	59

37. MISCELLANEOUS PROBLEMS.

1. Two persons start from the same place and travel in the same direction; one travels 40 miles an hour, and the other 35 miles an hour; how far apart will they be in 1 hour? (Show by drawing.) How far in 6 hours?

2. Charles gets \$6 a month for selling a daily paper; Henry gets $\frac{1}{3}$ as much for selling a weekly paper; how much will both have earned in 5 months?

3. From a chest of tea, containing 60 pounds, 9 pounds were sold at \$1 a pound; what was the value of the remainder, at the same rate?

4. I bought a bushel of tomatoes for 70 cents, a half-bushel of turnips for 20 cents, and a peck of beans for 10 cents; what I paid for all was 8 cents more than the cost of half a bushel of sweet potatoes. What did the sweet potatoes cost?

5. A box contains 134 oranges, and a barrel contains 64 more than the box; how many oranges in the barrel?

6. I bought a horse and sleigh for $150; the sleigh cost $45; what did the horse cost?

7. After spending $80 for a pony, George found that he had $65 left in his savings bank; how much money had he at first?

8. In an orchard there are 150 apple trees; this is 50 more than the number of peach trees; how many peach trees are there?

9. A man having 190 young orange trees, bought 89 more, and then sold 50; how many had he left?

10. Add three hundred nine to seven hundred eleven, and subtract twenty-nine.

11. A farmer bought 40 sheep for 144 dollars at one time, and 50 sheep for 155 dollars at another time; how much did the sheep cost him?

12. A boy shot an arrow 145 feet up the road, and another 149 feet down the road; how far were the arrows apart? (Drawing.)

38. READING AND WRITING NUMBERS.

HOW TO EXPRESS THOUSANDS.

You have learned that the number *one thousand* is expressed by writing the figure 1 to the left of hundreds.

Read the following numbers:

1,500	1,230	1,400	1,670	1,873	1,999
1,220	1,864	1,748	1,976	1,449	1,650

The period of ones is separated from the thousands by a comma.

Write in figures: two thousand, three thousand, five thousand, eight thousand, nine thousand.

Read the following numbers:

(1)	(2)	(3)	(4)	(5)
3,000	7,000	6,350	4,500	9,400
3,200	5,102	8,008	1,111	0,444
4,340	2,501	8,108	1,001	2,020
8,650	7,206	0,888	1,100	4,009
9,241	7,777	5,230	1,004	9,999

39. The greatest number that can be expressed by four figures is 9,999.

Write in figures:

Three thousand seven hundred fifty.

Eight thousand two hundred two.

One thousand eleven; one thousand one.

Five thousand five; five thousand fifty.

Four thousand thirty-five; four thousand five.

Express in figures numbers composed of:

0	thousands	6	hundreds	7	tens	and	4	ones.
3	"	3	"	3	"	"	3	"
9	"	8	"	5	"	"	6	"
8	"	0	"	0	"	"	7	"
5	"	9	"	9	"	"	0	"

40. TABLE OF ROMAN NOTATION.

30	40	50	60	70	80	90	100
XXX	XL	L	LX	LXX	LXXX	XC	C

When a letter is repeated, its value is repeated.

When a letter is placed after one of greater value, its value is added; when placed before, its value is subtracted from the greater.

Express the following numbers by figures:

XXXIX	LIX	XC	XCIX
XLIX	LXV	XCI	XCVIII
XLVIII	LXX	LXXXIX	LXXIX
XIX	XLXXX	XCVIII	XLIV
XXIX	LXXX	LXXXVIII	LXVI

41. REVIEW.

Copy and add:

(1)	(2)	(3)	(4)	(5)	(6)
393	995	767	933	762	739
335	239	799	373	985	833
539	633	333	483	333	959
853	345	854	423	469	393
994	983	234	893	433	933
334	339	928	233	824	345
949	463	843	943	244	449
343	434	343	343	943	483
389	897	788	387	888	799
979	767	878	997	879	779

(7)	(8)	(9)	(10)	(11)	(12)
388	399	899	188	929	385
339	338	993	998	399	633
583	593	339	939	533	863
994	999	348	293	337	233
334	329	343	999	953	994
438	432	498	828	999	888
433	432	983	393	283	333
843	842	333	333	333	383
987	977	379	338	376	398
779	779	977	799	779	798

42. MISCELLANEOUS PROBLEMS.

1. John had 11 quarts of nuts and sold 8 pints; how many had he left?

2. A girl sold 3 quarts of berries each day for 10 days; how many pecks did she sell?

3. A druggist has 7 gal. 2 qt. of kerosene. How long will it last him if he sells 1 quart each day?

4. A carpenter bought a piece of wood 4 ft. 6 in. long, at 8 cents a foot; what did the wood cost him?

5. How many sashes, each 3 yd. 1 ft. long, can be cut from 10 yd. of silk?

6. How many pint bottles will it take to hold 3 gallons of ammonia?

7. If you pick 4 pecks of berries a day, and I pick 2 pecks, in how many days will we pick 6 bushels?

8. A merchant living 18 miles out of Chicago, goes to the city every morning and returns in the evening; how many miles does he travel in 4 days?

9. A shoe merchant sold four dozen pairs of shoes for $192; this is $24 more than they cost him; what did they cost?

10. Holt & Co. sold 620 pairs of gloves this month, which is 20 pairs less than they sold last month; how many pairs were sold last month?

43. Subtract:

(1)	(2)	(3)	(4)	(5)	(6)
4221	5121	7011	3121	6321	4112
132	223	213	232	332	123

7. 9131 − 322 = ?
8. 4011 − 303 = ?
9. 5210 − 223 = ?
10. 3101 − 222 = ?
11. 5119 − 223 = ?
12. 3122 − 123 = ?
13. 2121 − 312 = ?
14. 4118 − 223 = ?
15. 5102 − 213 = ?
16. 6110 − 123 = ?
17. 8112 − 213 = ?
18. 7231 − 322 = ?
19. 5012 − 223 = ?
20. 4610 − 132 = ?
21. 7051 − 233 = ?
22. 6311 − 233 = ?
23. 5012 − 213 = ?
24. 6300 − 1311 = ?

44. Add:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
329	782	973	668	993	388	922	725	296
563	999	992	382	369	29	225	963	927
335	393	235	829	632	878	763	273	263
883	425	953	293	258	133	197	723	539
223	483	339	935	939	393	333	224	333
993	823	588	353	382	683	548	369	834
884	283	323	433	429	134	341	322	244
338	925	393	433	493	395	933	433	325
796	894	399	937	999	497	939	969	469
766	775	878	697	569	778	799	787	976

(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
997	893	97	776	338	686	998	737	695
393	95	93	983	539	838	239	939	333
438	939	929	334	363	262	893	363	343
342	258	388	533	899	939	289	484	443
749	933	523	368	233	388	233	434	884
382	389	399	882	945	533	434	878	228
922	422	982	299	343	393	434	923	983
393	493	333	933	888	393	343	393	323
397	98	377	889	896	399	379	789	398
977	778	879	779	676	775	878	787	978

45. MISCELLANEOUS PROBLEMS.

1. James has 9 cents, John three times as many less 6; how many has John? How many have both?

2. One day a man traveled 25 miles by railroad, 34 miles by steamboat, and 19 miles by stage, and returned 18 miles; how far is he from home?

3. I bought 4 yards of silk at $2 a yard, 2 shawls at $10 each, and some cashmere for $10; how much change ought I to receive from 4 ten-dollar bills?

4. A grocer paid $165 for 30 barrels of flour, $50 for 100 barrels of potatoes, and $45 for 15 barrels of apples; how much did he pay for all?

5. A boy who had 53 marbles loaned 20, and afterwards borrowed 9 more; how many marbles had he then?

6. A boy paid $20 for a team of goats, $8 for his carriage, and $4 for harness; he sold them for $\frac{1}{8}$ less than they cost him; for how much did he sell them?

7. I bought 3 yards of cloth at $7 a yard for a coat; the buttons and cord cost $2, the making of it $6; for how much must I sell it to gain $5.50?

8. A pole is 40 feet long. If $\frac{1}{3}$ of it is in the ground, $\frac{1}{10}$ of it in the water, and the rest in the air, how many feet in the air?

9. A man gave a carriage and $100 in money for a lot worth $400; what was the value of the carriage?

10. Some children returned from the lake with a basket of shells; after giving half of them away they had 95 left; how many had they at first?

11. A party of school children went to Fairview Park: $1.75 is 50 cents less than they paid for car fare; how much did they pay?

12. John bought a pack of shingles, and after mending the roof had 75 left; if he used 175, how many did the pack contain at first?

13. A farmer having $157 paid one half of his money for a horse, and one half the remainder for a cow; how much did each animal cost, and how much money had he left?

CHAPTER IV.

NUMBERS FROM FORTY TO FIFTY.

1. Draw 42 leaves and divide them into sevens.

7 can be taken out of 42 how many times?

$42 \div 7 = ?$ $6 \times 7 = ?$ $\frac{1}{6}$ of $42 = ?$

If you have 42 pansies, tied in bunches of 7 each, how many bunches will you have?

Draw the leaves in sixes. 42 equals how many 6's? $42 \div 6 = ?$ $7 \times 6 = ?$ $\frac{1}{7}$ of $42 = ?$

How many days in 6 weeks?

Plant 42 tuberoses in 7 equal rows; how many in each row? (Drawing.)

Make questions for:

$7 \times 6 = 42.$ $42 \div 7 = 6.$ $\frac{1}{7}$ of $42 = 6.$

42 equals how many 4's? How many 8's? How many 5's?

A family used 42 bushels of apples in 8 months; at that rate, how many bushels were used in one month?

2. Draw 44 circles in fours.

$44 \div 4 = ?$ $11 \times 4 = ?$ $\frac{1}{11}$ of $44 = ?$

At a picnic 44 cups of lemonade were passed to 11 rows of children; how many cups were passed to each row?

Divide 44 into elevens.

$44 \div 11 = ?$ $4 \times 11 = ?$ $\frac{1}{4}$ of $44 = ?$

44 quarts of ice-cream are how many gallons?

3. REVIEW.

$6 \times 7 = ?$	$44 \div 11 = ?$	$\frac{1}{8}$ of $42 = ?$	$8 \times 5\frac{1}{8} = ?$
$11 \times 4 = ?$	$43 \div 10 = ?$	$\frac{1}{4}$ of $41 = ?$	$41 \div 5 = ?$
$4 \times 10\frac{1}{4} = ?$	$42 \div 7 = ?$	$\frac{1}{8}$ of $42 = ?$	$42 \div 6 = ?$
$8 \times 5\frac{1}{2} = ?$	$42 \div 8 = ?$	$\frac{1}{8}$ of $43 = ?$	$6 \times 7\frac{1}{8} = ?$

John gathered 42 quarts of chestnuts; how many pecks did he gather?

Mary goes to school 44 weeks in the year; if there are 4 terms of equal length, how many weeks in each term?

How long will 43 pounds of butter last, if used at the rate of 6 pounds a week?

43 pecks of apples are how many bushels?

At \$5 a pair, how many pairs of shoes can be bought for \$43?

Make problems for:

$6 \times 7 = 42$. $7 \times 6 = 42$. $\frac{1}{4}$ of $41 = 10\frac{1}{4}$.

$\frac{1}{8}$ of $41 = 8\frac{1}{8}$. $\frac{1}{8}$ of $42 = 5\frac{1}{4}$. $43 \div 4 = 10\frac{3}{4}$.

4. Draw 45 wheels in nines. 45 equals how many nines?

$45 \div 9 = ?$ $5 \times 9 = ?$ $\frac{1}{5}$ of $45 = ?$ $\frac{2}{5}$ of $45 = ?$

At 9 cents a pound, how many pounds of raisins can you get for 45 cents?

Draw 45 wheels in 5's. 45 equals how many 5's?

$45 \div 5 = ?$ $9 \times 5 = ?$ $\frac{1}{9}$ of $45 = ?$

How many yards in 9 rolls of wall paper, if each roll contains 5 yards?

$\frac{1}{4}$ of $45 = ?$ $\frac{1}{6}$ of $45 = ?$

5. Draw 48 spools in 12's. 48 equals how many 12's?

$48 \div 12 = ?$ $4 \times 12 = ?$ 12 is what part of 48? $\frac{1}{4}$ of $48 = ?$

48 inches of ribbon will make how many neck-ties, if 12 inches make one neck-tie?

At 12 cents a dozen, what will 4 dozen buttons cost?

48 equals how many 4's? $48 \div 4 = ?$ $12 \times 4 = ?$

4 is what part of 48?

At 4 cents each, how many papers of needles can be bought for 48 cents?

How many tires have the wheels of 4 wagons?

Ella drew 48 beech nuts, 8 in each group; how many 8's did she draw? 48 is how many 8's?

$48 \div 8 = ?$ $6 \times 8 = ?$ $\frac{1}{6}$ of $48 = ?$ 8 roses is $\frac{1}{6}$ of all the roses I gathered this morning; how many did I gather?

48 is how many 6's? $48 \div 6 = ?$ $8 \times 6 = ?$

6 is $\frac{1}{8}$ of the number of children in school; how many are there in school?

I paid 6 cents for a stamp for a package; how many such stamps will 48 cents buy?

6. 49 is how many 7's? $49 \div 7 = ?$ $7 \times 7 = ?$ $\frac{1}{7}$ of $49 = ?$

49 loaves of bread will last a camping party how many days, if they use 7 loaves a day?

Make problems for:

$\frac{1}{12}$ of $49 = 4\frac{1}{12}$. $\frac{1}{4}$ of $49 = 12\frac{1}{4}$.

7. 50 equals how many 10's? $50 \div 10 = ?$ $5 \times 10 = ?$ $\frac{1}{5}$ of $50 = ?$

Five pairs of gloves have how many fingers?

50 equals how many 4's? 50 bushels of apples are how many pecks? Divide 50 sheets of drawing paper equally among 4 pupils; how many sheets will each receive?

50 equals how many 12's? $4 \times 12\frac{1}{2} = ?$

At $12\frac{1}{2}$ cents a yard, how many yards of muslin can be bought for 50 cents?

50 equals how many 6's? $8\frac{1}{3}$ sixes are how many? $\frac{1}{6}$ of $50 = ?$ $8\frac{1}{3}$ is what part of 50?

At 6 cents a yard, how many yards of ribbon can you buy for 50 cents?

50 equals how many 8's? $6\frac{1}{4}$ eights are how many ones? $6\frac{1}{4}$ is what part of 50? $6\frac{1}{4}$ times 8 equals what? $\frac{1}{8}$ of $50 = ?$

I gave 50 cents for 8 yards of calico; how much is that a yard?

Make problems for:

$6 \times 8\frac{1}{3} = 50.$ $\quad 50 \div 6 = 8\frac{1}{3}.$ $\quad 50 \div 8 = 6\frac{1}{4}.$

8. REVIEW.

$48 \div 12 = ?$	$\frac{1}{4}$ of $50 = ?$	$6 \times 8\frac{1}{3} = ?$	$8 \times 6\frac{1}{4} = ?$
$49 \div 12 = ?$	$\frac{1}{4}$ of $48 = ?$	$4 \times 12\frac{1}{2} = ?$	$12 \times 4 = ?$
$50 \div 12 = ?$	$\frac{1}{7}$ of $49 = ?$	$7 \times 7 = ?$	$4 \times 12\frac{1}{3} = ?$
$48 \div 6 = ?$	$\frac{1}{8}$ of $48 = ?$	$6 \times 8 = ?$	$8 \times 6 = ?$

50 cents is how many 5-cent pieces? How many dimes?

How many 2-cent postage stamps can you buy for 50 cents?

If you can get 2 oranges for 5 cents, how many can you get for 50 cents?

When eggs are $8\frac{1}{3}$ cents a dozen, how many dozen can be bought for 50 cents?

A pole 48 feet long is $\frac{1}{4}$ in the water and $\frac{3}{4}$ in the air. How many feet are in the air?

At $6\frac{1}{4}$ cents a ball, how many balls of twine can you buy for 50 cents?

Make problems for:

$\frac{1}{7}$ of $49 = 7.$ $\quad 7 \times 7 = 49.$ $\quad \frac{1}{4}$ of $49 = 12\frac{1}{4}.$

$6)\overline{48}$ $\quad 8$ $\qquad 4)\overline{50}$ $\quad 12\frac{1}{2}$

$8 \times 6\frac{1}{4} = 50.$ $\quad 12 \times 4\frac{1}{6} = 50.$ $\quad 6 \times 8\frac{1}{3} = 50.$

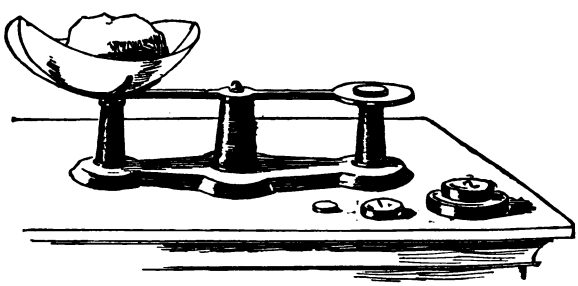
9. Copy and learn:

$42 \div 7 = 6.$	$6 \times 7 = ?$	$48 \div 4 = 12.$	$12 \times 4 = ?$
$42 \div 6 = 7.$	$7 \times 6 = ?$	$48 \div 8 = 6.$	$6 \times 8 = ?$
$44 \div 11 = 4.$	$4 \times 11 = ?$	$48 \div 6 = 8.$	$8 \times 6 = ?$
$44 \div 4 = 11.$	$11 \times 4 = ?$	$49 \div 7 = 7.$	$7 \times 7 = ?$
$45 \div 9 = 5.$	$5 \times 9 = ?$	$50 \div 10 = 5.$	$5 \times 10 = ?$
$45 \div 5 = 9.$	$9 \times 5 = ?$	$50 \div 5 = 10.$	$10 \times 5 = ?$
$48 \div 12 = 4.$	$4 \times 12 = ?$	$\frac{1}{7}$ of $49 = ?$	$\frac{1}{8}$ of $48 = ?$

REVIEW.

$7 \times 3 = ?$	$27 \div 9 = ?$	$2 \times 16 = ?$	$36 \div 9 = ?$
$2 \times 11 = ?$	$28 \div 2 = ?$	$4 \times 8 = ?$	$35 \div 5 = ?$
$3 \times 8 = ?$	$30 \div 15 = ?$	$3 \times 11 = ?$	$40 \div 8 = ?$
$9 \times 3 = ?$	$30 \div 5 = ?$	$7 \times 5 = ?$	$32 \div 4 = ?$
$6 \times 5 = ?$	$28 \div 7 = ?$	$3 \times 12 = ?$	$24 \div 8 = ?$

10. A pound is how many ounces? Half a pound of candy is how many ounces?



If I put the pound weight on one side of the scales, how many ounces must I put on the other side to balance it?

$\frac{1}{4}$ of a pound is how many ounces? If I wish to buy a quarter of a pound of tea, how many ounces must be put upon the scales to balance it?

4 ounces of ginger are what part of a pound? At 5 cents an ounce, what will $\frac{1}{4}$ of a pound of celery seed cost?

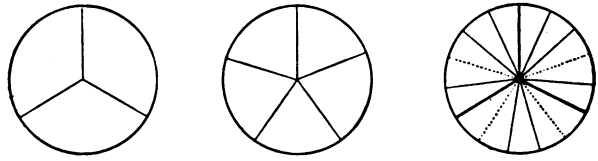
At 2 ounces for 5 cents, how many ounces of pepper can be bought for 20 cents?

$1\frac{1}{2}$ pounds of figs are how many ounces?

$\frac{3}{4}$ of a pound of maple sugar is how many ounces?

16 ounces (oz.) are 1 pound (lb).

11. Comparison of one third and one fifth:



Into how many equal parts is the first circle divided? Into how many equal parts is the second divided? Which is more, $\frac{1}{3}$ of a pie, or $\frac{1}{5}$?

Into how many equal parts is the third circle divided? What is *one* of the fifteen equal parts called? How many of these *fifteenths* make $\frac{1}{3}$ of the whole circle?

$\frac{1}{3}$ is how many fifteenths? $\frac{2}{3}$ are how many fifteenths? $\frac{3}{3}$ are how many fifteenths?

12. Draw the second circle upon your slate;

divide it into fifths by strong lines. Divide each fifth into three equal parts. Into how many parts is the whole circle now divided?

$\frac{1}{5}$ is how many fifteenths? $\frac{2}{5}$ are how many fifteenths?

Look at the third circle: find $\frac{1}{5}$ of it. Find $\frac{1}{3}$ of the whole circle. $\frac{1}{3}$ is how much more than $\frac{1}{5}$?

$\frac{1}{3}$ and $\frac{1}{5}$ are how many fifteenths? $\frac{2}{3}$ and $\frac{1}{5}$ are how many fifteenths?

$\frac{1}{5}+\frac{1}{15}=?$ $\frac{1}{3}+\frac{2}{15}=?$ $\frac{2}{5}-\frac{1}{3}=?$ $1-\frac{2}{3}=?$ $1-\frac{2}{15}=?$

$\frac{2}{3}+\frac{1}{15}=?$ $\frac{1}{3}+\frac{4}{15}=?$ $\frac{3}{5}-\frac{1}{3}=?$ $1-\frac{2}{5}=?$ $1-\frac{4}{15}=?$

Robert eats $\frac{1}{5}$ of a melon, gives George $\frac{1}{3}$, and the remainder to Harry; what part of the whole melon does Harry get?

13. Look at the circles, and answer these questions:

$\frac{5}{15}$ are how many thirds?
$\frac{10}{15}$ are how many thirds?
$\frac{3}{15}$ are how many fifths?
$\frac{6}{15}$ are how many fifths?

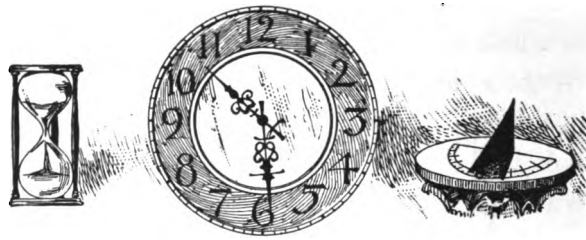
$\frac{5}{5}$ are how many wholes?
$\frac{3}{3}$ are how many wholes?
$\frac{10}{5}$ are how many wholes?
$\frac{20}{5}$ are how many wholes?
$\frac{30}{15}$ are how many wholes?

$3\times\frac{1}{3}=?$ $3\times\frac{2}{3}=?$ $6\times\frac{2}{3}=?$ $6\times\frac{3}{5}=?$ $3\times\frac{6}{15}=?$

$\frac{1}{3}$ of $\frac{1}{5}$ is what part of the whole? $\frac{1}{3}$ of $\frac{2}{5}=?$ $\frac{1}{3}$ of $\frac{3}{15}=?$

A grocer sold $\frac{2}{3}$ of a box of tea, and used $\frac{1}{5}$; what part of the whole remained unsold?

MEASURING TIME.



14. Are there any other ways of measuring time than by the clock and the hourglass? Have you ever seen a sundial? Which one of the kings of England is said to have measured the day by burning notched candles?

How many minutes is the long hand in passing from one figure to another?

The space between the figures is divided into five equal parts. The long hand is a minute in passing over one of these smallest spaces. See how many times you can walk across the floor in a minute. Sit still and watch the clock a minute; notice how much space the long hand has passed over.

15. Is there a smaller portion of time than a minute measured by the clock? Some clocks tick 60 times in a minute. *Sixty seconds make a minute.* 30 seconds are what part of a minute?

How long does it take the minute hand to move entirely round the face of the clock? Count the

small spaces on the face of the clock. *Sixty minutes make an hour.*

How many minutes in 2 hours? 5 minutes are what part of an hour? What time is it by the clock on page 108?

If the long hand were moved forward to the figure 1, what time would the clock show? Where will the short hand of the clock point when the minute hand points to 6? (Draw this upon your slate. What time does your clock show?)

16. How many hours from 6 in the morning until noon? How many hours from noon until midnight? 24 *hours make a day.*

How many days make a week? How many weeks make a month? Name the months in order. Name those which have 30 days. How many days in February?

60 seconds (sec.)	= 1 minute (min.).
60 minutes	= 1 hour (h.).
24 hours	= 1 day (d.).
7 days	= 1 week (w.).
4 weeks	= 1 month (m.).
12 months 365 days	= 1 year (yr.).

17. MISCELLANEOUS PROBLEMS.

1. If in a half day a man picks 6 bushels of apples, and a boy 3 bushels; how many bushels will both pick in 5 half days?

2. A carrier having 42 New Year's addresses, sold all but $\frac{1}{6}$ of them; how many did he sell? How many had he left?

3. Henry's age, which is 7 years, is 1 seventh of his father's age; how old is his father?

4. What measure holds 4 pecks? 48 pecks of cranberries are how many bushels?

5. A boy having 45 cents spent $\frac{1}{9}$ of his money for drawing paper and $\frac{1}{5}$ for pencils; how many cents had he left?

6. How many wheels have six freight cars, if each car has 8 wheels?

7. A farmer's boy fed to his colt $\frac{1}{2}$ a peck of oats each day for eight days; how many bushels is that?

8. How many pickets have 7 gates, if each has 6 pickets?

9. John had 5 dimes; he spent 8 cents for stamps, and with the remainder took 7 car rides; what was each fare?

10. How many leaflets have 7 leaves of a rose-bush, if each leaf has 5?

11. I bought a steak weighing a pound and a half; how many ounces did it weigh?

12. If 3 pounds of coffee are used in 8 days, how many ounces are used in 1 day?

13. A bushel of wheat weighs 60 pounds; how many pounds does a peck weigh?

14. Wheat bran weighs 20 pounds to the bushel; what is the weight of a peck?

Does a pound of wheat weigh more than a pound of bran? Weigh them, and notice the difference in bulk.

15. A bushel of buckwheat weighs 42 pounds; what does a peck weigh?

(16) Add $\frac{1}{5}$ of 45 to $\frac{1}{7}$ of 49. (17) $45 - 5 - 9 + 8 = ?$

(18) $6 \times 7 + 8 - 25 = ?$ (19) $6 \times 7 + (?) = 50.$

(20) $\frac{1}{6}$ of $45 + 3 = \frac{1}{4}$ of what? (21) $7 \times 7 - (?) = 42.$

(22) 6×8 are how many times 12?

(23) $27 \div 3 \times 5 + 5 - 8 = ?$

18. ADDING AND SUBTRACTING 4's.

Make a table adding 4 to numbers ending in 4.

Subtract 4 from numbers ending in 8; 4 from numbers ending in 4.

4 + 4.

4	14	24	34	44	54	64	74	84	94
4	4	4	4	4	4	4	4	4	4

(1)	(2)	(3)	(4)	(5)	(6)
212	444	929	424	394	793
444	943	393	492	834	339
422	222	994	333	919	449
244	779	933	629	343	333
444	322	243	333	424	934
422	988	928	837	233	382
244	232	933	292	392	893
444	424	397	486	398	329
243	787	683	766	629	892
937	347	677	226	552	458

19. 4 + 5, AND REVIEW.

14	24	34	44	54	64	74	84	94	104
5	5	5	5	5	5	5	5	5	5

(1)	(2)	(3)	(4)	(5)	(6)
425	9	2	54	219	494
554	54	594	294	442	535
141	745	224	591	234	241
514	293	451	435	335	445
445	492	234	954	498	493
151	335	334	839	513	132
415	632	243	332	354	989
552	933	328	535	735	219
326	379	289	232	221	853
396	618	902	893	449	508

20. MISCELLANEOUS PROBLEMS.

1. How many hours in $2\frac{1}{2}$ days?

2. If a boy is 3 minutes late at school, how many seconds has he lost?

3. For our school gardens we spent \$1.50 for foliage plants, \$2.10 for geraniums, \$1 for tulip bulbs, and \$2 for roses and pansies. How much money had we left out of \$10, after paying for all?

4. A farmer raises 850 bu. of corn, 720 bu. of oats, 560 bu. of wheat, 390 bu. of barley, 78 bu. of buckwheat; how much grain has he in all?

5. I had in bank \$1125, and drew out \$415 and \$290; how much is left in bank?

6. Johnson & Co., after selling 2000 cans of sugar corn, had 1500 cans left; how many cans were on sale at first?

7. If I have $230, how much must I add to it to be able to buy a horse and buggy worth $550?

8. A man receives $700 for his fruit crop this year, which is $150 more than he received last year; how much did he receive last year?

9. Add 300 to 500, and from this sum subtract their difference.

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21. Subtract 4 from numbers ending in 1, 2, and 3. Give the ending figure first, then the whole remainder.

11	21	31	41	51	61	71	81	91	101
4	4	4	4	4	4	4	4	4	4
12	22	32	42	52	62	72	82	92	102
4	4	4	4	4	4	4	4	4	4
13	23	33	43	53	63	73	83	93	103
4	4	4	4	4	4	4	4	4	4
21	32	43	52	61	73	80	92	101	100
4	4	4	4	4	4	4	4	4	4

Make tables subtracting 4 from numbers ending in 5, 6, 7, 8, and 9.

22. Subtract:

(1)	(2)	(3)	(4)	(5)	(6)
4310	5321	8234	6212	8402	5321
234	404	344	334	314	334

7. $9139 - 244 = ?$
8. $8123 - 334 = ?$
9. $5210 - 334 = ?$
10. $9431 - 424 = ?$
11. $5234 - 325 = ?$
12. $9123 - 234 = ?$
13. $9351 - 3544 = ?$
14. $4352 - 1443 = ?$
15. $6231 - 344 = ?$
16. $9132 - 334 = ?$
17. $6320 - 2344 = ?$
18. $8123 - 3254 = ?$

Make problems for:

$51 - 4 = 47$. $83 - 4 = 79$. $52 - 4 = 48$.
$91 - 4 = 87$. $70 - 4 = 66$.

23. 4 + 6, AND REVIEW.

4	14	24	34	44	54	64	74	84	94	104
6	6	6	6	6	6	6	6	6	6	6

(1)	(2)	(3)	(4)	(5)	(6)
389	644	246	454	695	946
983	655	564	645	244	354
439	262	441	242	363	241
690	344	454	464	448	664
834	465	635	345	452	395
376	544	384	369	224	26
946	996	726	892	994	994
562	326	549	839	539	618
55	897	73	686	73	43
7	557	28	154	58	9

24. MISCELLANEOUS PROBLEMS.

1. Four boys worked together, and received $3 for a day's work. If they divide the money equally, what part will each receive? How many cents will each receive?

2. $9 is $\frac{1}{5}$ of my money; how much money have I?

3. $5\frac{1}{3}$ qts. is $\frac{1}{3}$ of all the berries James has to sell; how many quarts has he?

4. George and his two cousins received a present of 2 watermelons; they divided them equally; what was the share of each?

5. May, Ella, and Ruth made 32 pints of grape jelly, and divided it equally; what was each one's share of the whole?

6. George says, "61 marbles is 4 more than all I have;" how many marbles has he?

Frank says, "Take 4 from 31 and it will leave half of my marbles;" how many marbles has Frank?

7. A boy standing 30 feet from the edge of the water, shot an arrow to an island 40 feet from the shore. How far must he go in walking and rowing to get the arrow and return to the place of starting?

8. Bought 10 yd. of silk for $9.50, and $10\frac{1}{2}$ yd. of cloth for $5.25; how much more did the silk cost than the cloth?

9. A man owing $1000 made 2 payments, one of $180 and one of $260; how much remained unpaid?

10. A planing mill sells 680 ft. of pine lumber, 845 ft. of poplar, 398 ft. of cherry, 480 ft. of ash, 560 ft. of walnut, 746 ft. of maple. How many feet were sold?

25. 4 + 7.

4	14	24	34	44	54	64	74	84	94
7	7	7	7	7	7	7	7	7	7

(1)	(2)	(3)	(4)	(5)	(6)
634	646	689	956	497	90
476	443	344	734	973	994
634	574	765	275	748	427
446	437	337	347	480	99
667	649	784	564	39	749
743	767	369	449	3	969
367	424	244	992	989	793
473	396	936	738	927	739
452	787	879	788	697	77
849	567	652	253	47	64

7. 477 + 743 + 267 + 344 + 598 + 442 + 675 + 484 + 834 + 646 = ?

8. Add 594, 764, 432, 474, 544, 347, 854, 334, 788, and 568.

9. Find the amount of 9, 93, 838, 297, 944, 469, 93, 739, 479, and 60.

10. Find the sum of 9, 34, 897, 378, 949, 983, 639, 84, 1, 78, and 78

11. 44 + 987 + 909 + 738 + 493 + 989 + 37 + 704 + 989 + 44 + 7 = ?

12. 839 + 799 + 3 + 488 + 937 + 784 + 478 + 842 + 649 + 83 + 9 + 9 = ?

13. Add 39, 899, 980, 97, 734, 97, 473, 648, 783, 68, 4, 7.

26. Perform the following examples:

1. 8013 − 334 = ?
2. 7321 − 233 = ?
3. 8122 − 124 = ?
4. 6124 − 334 = ?
5. 9324 − 405 = ?
6. 8432 − 445 = ?
7. 6242 − 2345 = ?
8. 6301 − 3444 = ?
9. 6413 − 1434 = ?
10. 8354 − 3545 = ?
11. 7333 − 2234 = ?
12. 7421 − 3432 = ?
13. 9341 − 445 = ?
14. 2143 − 535 = ?
15. 7340 − 534 = ?
16. 7331 − 435 = ?
17. 6324 − 1325 = ?
18. 5412 − 3444 = ?

27. MISCELLANEOUS PROBLEMS.

1. I bought for Christmas presents a calendar, for which I paid $1, a bronze inkstand for $1.50, a paper weight for 90 cents, and an album for $2.50; what did I pay for all?

2. I received $148 for fruit trees, and $260 for shade trees; the expense of raising the fruit trees was $40, and the shade trees $50; what were the profits on each?

3. Bought a house, lot, horse, and buggy for $1400. If I paid $600 for the lot, and $200 for the horse and buggy, how much was paid for the house?

4. If I borrow at one time $327, and at another time $783, how much do I owe after paying $221?

5. The greater of two numbers is 419, and the less 244; what is their difference?

6. Henry's father was born in 1859; how old is he now?

7. The sum of two numbers is 650; one of the numbers is 200; what is the other?

28. REVIEW.

Add rapidly, giving the ending figures first, then the whole sum:

6	9	7	8	5	9	7	9
22	32	42	52	62	72	82	92
9	8	7	6	9	7	8	9
23	33	43	53	63	73	83	93
5	4	6	7	5	7	6	7
24	34	44	54	64	74	84	94
4	4	4	4	4	4	4	4
34	46	55	67	74	85	95	37

Add the following lines, beginning at the left:

7, 7, 4, 2, 4, 4, 2, 5, 4, 1, 4, 5, 1, 5, 3, 3, 9.
8, 8, 4, 6, 4, 4, 4, 2, 5, 4, 1, 5, 4, 2, 8, 3, 2, 7.
5, 4, 4, 9, 8, 4, 5, 1, 4, 4, 2, 9, 3, 7, 2, 3, 6, 4.
7, 4, 5, 4, 7, 4, 7, 3, 3, 6, 5, 4, 1, 9, 3, 2, 6, 7.
8, 3, 7, 3, 4, 4, 2, 8, 3, 3, 4, 3, 8, 7, 4, 8, 3, 2.
9, 3, 9, 9, 8, 3, 7, 3, 6, 4, 4, 4, 1, 7, 4, 5, 4, 9.

29. 4 + 8.

4	14	24	34	44	54	64	74	84	94	104
8	8	8	8	8	8	8	8	8	8	8

(1)	(2)	(3)	(4)	(5)	(6)
448	283	184	444	979	89
662	224	626	666	887	48
448	484	484	444	222	994
662	644	226	636	348	479
848	882	484	433	563	749
262	244	826	447	387	984
448	866	284	384	744	936
880	288	841	327	399	994
526	447	28	773	393	649
38	267	939	668	968	99

7. Add 384, 384, 348, 314, 958, 328, 733, 493, 889, and 269.

8. Find the sum of 799, 423, 853, 124, 489, 534, 928, 298, 988, and 464.

9. 84 + 47 + 978 + 288 + 784 + 349 + 899 + 892 + 699 + 39 + 48 + 84 = ?

10. Find the amount of 83, 387, 938, 974, 949, 889, 398, 794, 448, 983, 348, 87, 4.

Subtract:

1. 8234 — 1135 = ?
2. 8012 — 245 = ?
3. 4210 — 245 = ?
4. 6243 — 2345 = ?
5. 8544 — 2035 = ?
6. 5234 — 2245 = ?
7. 5312 — 325 = ?
8. 9323 — 5454 = ?
9. 9000 — 2001 = ?
10. 9011 — 7015 = ?

30. 4 + 9.

4	14	24	34	44	54	64	74	84	94	104
9	9	9	9	9	9	9	9	9	9	9

(1)	(2)	(3)	(4)	(5)	(6)
422	222	499	998	979	694
649	494	911	499	943	948
961	616	144	794	468	498
199	949	966	948	797	989
311	161	149	497	343	894
449	494	941	979	879	347
261	616	124	994	698	984
994	949	943	649	44	498
444	337	228	47	9	43
565	717	828	4	50	38

7. Add 98, 949, 899, 981, 444, 96, 974, 443, 78, and 68.

8. Find the amount of 949, 377, 994, 899, 448, 79, 794, 948, 98, and 744.

9. Find the sum of 998, 874, 949, 467, 94, 848, 78, 894, 749, 87, 44, and 9.

10. 78 + 90 + 949 + 478 + 44 + 909 + 887 + 94 + 989 + 708 + 79 + 3 = ?

11. 84 + 939 + 47 + 874 + 478 + 848 + 869 + 44 + 989 + 787 + 44 + 20 = ?

12. 44 + 969 + 448 + 99 + 794 + 447 + 74 + 878 + 849 + 94 + 49 + 489 = ?

31. MISCELLANEOUS PROBLEMS.

1. An agent during the year traveled 921 miles by railroad and 234 miles by boat; how much more did he travel by railroad than by boat?

2. A man had $5424. To his son he gave $965, and the remainder to his wife; what was his wife's share?

3. A father and his two sons earned $1843 in a year, the elder son earning $628, and the younger $456; how much did the father earn?

4. What year will it be, in 10 years from this time? In 20 years? In 150 years?

5. A merchant drew out of bank $650 one day, $327 the second, $474 the third, and then had $564 in bank; how much money had he in bank at first?

6. A man bought 23 barrels of flour for $138, 27 barrels for $135, and 36 barrels for $144; how many barrels did he buy, and how many dollars did he pay?

32. REVIEW.

Add:

9,	9,	4,	9,	9,	4,	7,	8,	4,	8,	3,	7,	3,	8,	6,	4.
7,	7,	9,	9,	9,	8,	4,	8,	3,	7,	3,	8,	7,	4,	6,	1.
4,	6,	7,	3,	9,	4,	9,	2,	8,	2,	7,	9,	4,	8,	8,	7.
4,	9,	9,	3,	4,	4,	6,	4,	8,	3,	7,	3,	8,	9,	9,	2.
6,	6,	6,	4,	8,	9,	4,	6,	4,	8,	7,	4,	5,	4,	7,	3.
4,	8,	9,	9,	8,	4,	6,	3,	6,	4,	3,	7,	3,	8,	2,	6.
6,	7,	6,	2,	4,	8,	3,	9,	4,	4,	9,	4,	8,	9,	3,	5.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
483	493	497	794	298	646	594	384	799	436
628	418	782	288	418	443	764	384	423	644
982	499	698	839	499	574	435	348	853	751
148	744	242	274	744	437	474	314	124	244
482	394	879	997	394	649	544	958	489	865
644	424	449	434	424	767	347	328	534	496
966	494	894	939	494	424	854	733	928	724
188	428	324	977	428	396	334	493	298	998
447	787	998	799	787	787	788	889	988	713
357	653	338	764	653	567	568	269	464	249

Subtract:

1. $8301 - 2034 = ?$
2. $9312 - 3543 = ?$
3. $6431 - 2332 = ?$
4. $8433 - 3544 = ?$
5. $9441 - 5034 = ?$
6. $9400 - 3623 = ?$
7. $7322 - 6543 = ?$
8. $6411 - 5524 = ?$
9. $3501 - 3032 = ?$
10. $8332 - 6543 = ?$
11. $9420 - 5033 = ?$
12. $8742 - 5644 = ?$

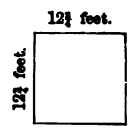
Add:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
989	798	873	889	999	934	498	496	787
322	979	845	944	844	844	844	844	444
877	292	149	233	455	955	467	984	485
713	933	952	724	488	488	327	985	575
442	244	347	243	319	544	943	438	824
983	759	732	863	942	223	168	578	498
524	282	444	143	243	935	484	314	899
554	444	244	933	354	194	343	993	422
627	489	536	259	386	938	348	119	644
978	879	878	778	979	968	798	688	549

CHAPTER V.

NUMBERS FROM FIFTY TO SEVENTY.

1. How many feet round a square garden-bed which is $12\frac{3}{4}$ feet on each side?



Divide 52 apples into thirteens.

52 pecks are how many bushels? 52 quarts are how many pecks? 52 quarts are how many gallons?

How many yards of fringe will be used for 6 rugs, if $8\frac{2}{3}$ yards are required for each?

Some children made a trimming of oak leaves, to decorate the schoolroom for autumn: they made 52 feet in all. How shall they divide it to put across the tops of 4 blackboards of equal length? (Drawing.)

2. 54 cherries are how many 9-cherries? $54 \div 9 = ?$ $6 \times 9 = ?$

9 is what part of 54? How many nines must you take from 54 to leave 9?

54 equals how many 6's? $54 \div 6 = ?$ $9 \times 6 = ?$ 6 is what part of 54?

Willie counted 9 joints in a cornstalk; how many joints have 6 such stalks?

How many sets of spoons, 6 in a set, in 54 spoons?

At $9 each, how many clocks can be bought for $54?

From a box of 54 pineapples, a dealer sold all but $\frac{1}{6}$; how many did he sell?

Make problems for:

52 yards $\div$ 8 = 6$\frac{1}{2}$ yards, each receives.

52 cents $\div$ 8 cents = (8-cents in 52 cents). 54 $\div$ 9 = 6.

Give the slate work in answer to your problems.

3. Draw 55 plums and divide them into 11's. 55 $\div$ 11 = ? 5 $\times$ 11 = ?

Divide them into 5's. 11 five's are how many? 55 $\div$ 5 = ?

5 is what part of 55? 11 is what part of 55?

4. Draw 56 flags; divide them into 8's. 56 $\div$ 8 = ? 7 $\times$ 8 = ?

Divide the 56 flags into 7's. 56 $\div$ 7 = ? 8 $\times$ 7 = ? 7 is what part of 56? $\frac{1}{8}$ of 56 = ?

5. REVIEW.

11 $\times$ 5 = ?	56 $\div$ 7 = ?	$\frac{1}{8}$ of 56 = ?	7 $\times$ 8 = ?
8 $\times$ 7 = ?	55 $\div$ 11 = ?	$\frac{1}{6}$ of 57 = ?	5 $\times$ 11$\frac{2}{5}$ = ?
6 $\times$ 9$\frac{1}{2}$ = ?	55 $\div$ 5 = ?	$\frac{1}{11}$ of 55 = ?	5 $\times$ 11$\frac{1}{5}$ = ?

If I earn $8 a week, how much do I earn in 7 weeks?

How many days of school in 11 school weeks of 5 days each?

At $5 each, how many silk umbrellas can be bought for $55?

57 quarts of ice cream were sold in one day; how many gallons were sold?

I have 56 flags to use for decorating 7 windows; how many shall I use for each window, if they are to be alike?

Make problems for:

$\frac{1}{7}$ of 56 = 8. $\frac{1}{8}$ of 57 = $9\frac{1}{2}$. $\frac{1}{3}$ of 57 = $6\frac{1}{3}$.

$6 \times 9 = 54$. $\frac{1}{11}$ of 55 = 5. $4 \times 13\frac{1}{2} = 54$.

Give slate work in answer to problems.

I planted 9 grape cuttings along a walk 57 feet in length; how far apart were they, if they were equally distant from each other? (Drawing.)

6. 60 is how many tens? $60 \div 10 = ?$ 10 is what part of 60?

60 is how many 6's? $60 \div 6 = ?$ $10 \times 6 = ?$ $\frac{1}{6}$ of 60 = ?

In how many months can I pay for a sewing machine which costs $60, if I pay $6 a month?

60 is how many 12's? Draw 60 nails and divide into 12's. $60 \div 12 = ?$ $5 \times 12 = ?$ $\frac{1}{5}$ of 60 = ? 12 is what part of 60?

A shoemaker bought 60 pounds of leather, and sold $\frac{1}{5}$ of it; how many pounds did he sell?

In 60 hours, how many days of 12 hours each?

60 is how many 5's? $60 \div 5 = ?$ $12 \times 5 = ?$ $\frac{1}{12}$ of $60 = ?$

A man sold $\frac{1}{12}$ of his load of 60 watermelons; how many did he sell? How many had he left?

60 is how many 15's? 15 minutes are what part of an hour?

How many 4's in 60? 4 is what part of 60?

A teacher divided 60 blocks of water colors equally among 15 pupils; how many blocks did each receive?

60 is how many times 30? 30 is what part of 60?

30 minutes are what part of an hour?

7. REVIEW.

$6 \times 10 = ?$	$4 \times 15 = ?$	$60 \div 6 = ?$	$60 \div 5 = ?$
$5 \times 12 = ?$	$2 \times 30 = ?$	$60 \div 12 = ?$	$60 \div 4 = ?$

If melons are selling at 3 for 10 cents, how many can you get for 60 cents? (Drawing.)

I paid $\frac{4}{5}$ of \$60 for my watch; what did it cost?

How many hours in $2\frac{1}{2}$ days of 24 hours each?

How many days in the months of September and November?

A horse travels 58 miles in 8 hours; how many miles an hour is that?

2 men do a piece of work in 30 days; how long will it take one man to do the work? Will it take 1 man a longer or a shorter time than 2 men?

Make problems for:

60 miles ÷ 12 miles = 5 (times).

60 miles ÷ 12 = 5 miles. 56 hours ÷ 7 hours = 8 (times).
56 hours ÷ 7 = 8 hours. 6 × 10 = 60. 5 × 12 = 60.

8. Draw 63 nails, and divide them into 9's.

63 ÷ 9 = ? 7 × 9 = ? $\frac{1}{7}$ of 63 = ?

Mary planted 63 melon seeds in 7 hills. If the seeds were equally divided, how many were in each hill?

Divide 63 into 7's. 63 is how many 7's? 9 × 7 = ?

Ella gathered some beechnuts on her way home from school. She says, "7 nuts are $\frac{1}{9}$ of all I have." How many nuts has she?

9. Draw 64 snow balls; divide them into 8's.

Eight boys are building a snow fort. If each makes 8 cannon balls of snow, how many will they have? 64 ÷ 8 = ? 8 × 8 = ? $\frac{1}{8}$ of 64 = ?

Make problems for:

64 ÷ 8 = 8. 63 ÷ 9 = 7. 62 ÷ 12 = $5\frac{1}{6}$. 10 × $6\frac{1}{10}$ = 61.
$\frac{1}{7}$ of 63 = 9. $\frac{1}{8}$ of 64 = 8. $\frac{1}{6}$ of 62 = $10\frac{1}{3}$.

10. 66 is how many 11's? 66 ÷ 11 = ? 6 × 11 = ? 11 is what part of 66?

Frank gave his parrot 6 peanuts in the morning and 5 at noon; if the same number are given each day, how many will the parrot get in 6 days?

66 is how many 6's? $66 will pay how many weeks' board at $6 a week? 6 is what part of 66?

11. 70 is how many 10's? $70 \div 10 = ?$ 10 is what part of 70? If you have 70 cents and spend $\frac{1}{7}$ of them, how many cents have you left?

70 is how many 7's? 7 is what part of 70?

70 days are how many weeks?

12. REVIEW.

1. 18 is how many sevenths of 63?

2. If a pair of curtains cost $11, what will 6 pairs cost?

3. How many desks in a schoolroom which has 7 rows and 9 desks in each row?

4. The water in a well is $8\frac{1}{2}$ feet deep; if this is $\frac{1}{8}$ of the depth of the well, how deep is it?

5. Carl says, "If my money were divided into 8 equal parts, one of the parts would be $8\frac{1}{8}$ cents." How much money has he?

6. A shepherd carried 7 lambs across a swollen stream; this was $\frac{1}{9}$ of the whole flock. How many sheep in the flock?

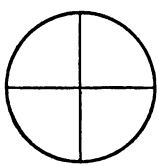
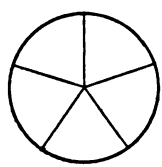
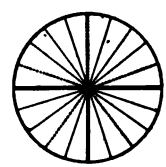
Make problems for:

63 trees $\div$ 9 trees = 7 (times).
63 trees $\div$ 9 = 7 trees.

13. Complete and learn:

$54 \div 9 = 6.$	$6 \times 9 = ?$	$11 \times 2 = ?$	$6 \times 5 = ?$
$54 \div 6 = 9$	$9 \times 6 = ?$	$12 \times 2 = ?$	$7 \times 5 = ?$
$55 \div 11 = 5.$	$5 \times 11 = ?$	$6 \times 3 = ?$	$8 \times 5 = ?$
$55 \div 5 = 11.$	$11 \times 5 = ?$	$7 \times 3 = ?$	$9 \times 5 = ?$
$56 \div 8 = 7.$	$7 \times 8 = ?$	$8 \times 3 = ?$	$10 \times 5 = ?$
$56 \div 7 = 8.$	$8 \times 7 = ?$	$9 \times 3 = ?$	$11 \times 5 = ?$
$60 \div 12 = 5.$	$5 \times 12 = ?$	$10 \times 3 = ?$	$12 \times 5 = ?$
$60 \div 5 = 12.$	$12 \times 5 = ?$	$11 \times 3 = ?$	$6 \times 6 = ?$
$60 \div 10 = 6.$	$6 \times 10 = ?$	$12 \times 3 = ?$	$7 \times 6 = ?$
$60 \div 6 = 10.$	$10 \times 6 = ?$	$6 \times 4 = ?$	$8 \times 6 = ?$
$63 \div 9 = 7.$	$7 \times 9 = ?$	$7 \times 4 = ?$	$9 \times 6 = ?$
$63 \div 7 = 9.$	$8 \times 7 = ?$	$8 \times 4 = ?$	$10 \times 6 = ?$
$64 \div 8 = 8.$	$8 \times 8 = ?$	$9 \times 4 = ?$	$11 \times 5 = ?$
$66 \div 6 = 11.$	$6 \times 11 = ?$	$10 \times 4 = ?$	$7 \times 7 = ?$
$70 \div 10 = 7.$	$7 \times 10 = ?$	$11 \times 4 = ?$	$8 \times 7 = ?$
$70 \div 7 = 10.$	$10 \times 7 = ?$	$12 \times 4 = ?$	$9 \times 7 = ?$

14. FOURTHS AND FIFTHS.

Which is more, $\frac{1}{4}$ of a melon or $\frac{1}{5}$? $\frac{1}{4}$ or $\frac{1}{5}$ of a dollar? $\frac{1}{5}$ of a dollar is how many cents? $\frac{1}{4}$ of a dollar is how many cents?

Draw the circles upon paper or upon slates. Into how many equal parts is the third circle divided? One of the twenty equal parts is called *one twentieth.*

$\frac{1}{4}$ of the whole circle is how many twentieths? $\frac{2}{4}$ or $\frac{1}{2}$ is how many twentieths?

Find $\frac{1}{5}$ of the second circle. $\frac{1}{5}$ is how many twentieths of the whole circle?

Draw a regular pentagon; divide it into 5 equal triangles. One of the triangles is what part of the pentagon? Divide the pentagon into *twentieths.* One of the triangles is how many twentieths of the pentagon?

Look at the circle and find the answers to these questions?

$\frac{1}{4} + \frac{1}{5}$ = how many twentieths?
$\frac{2}{5} + \frac{1}{4}$ = how many twentieths?
$\frac{1}{5} + \frac{1}{2}$ = how many twentieths?

$\frac{1}{5} + \frac{1}{4} = ?$ $\frac{3}{5} - \frac{1}{4} = ?$ $\frac{1}{4}$ of $\frac{4}{5}$ = what part of the whole circle?

$\frac{3}{4} + \frac{1}{5} = ?$ $\frac{1}{4} - \frac{1}{5} = ?$ $\frac{1}{4}$ of $\frac{4}{5}$ = what part of the whole?

$\frac{2}{5} + \frac{1}{2} = ?$ $\frac{2}{5} - \frac{1}{4} = ?$ $\frac{1}{5}$ of $\frac{1}{4}$ = what part of the whole?

John spent $\frac{1}{4}$ of his money for a sled, and $\frac{1}{5}$ for a pair of skates; what part of all his money had he left?

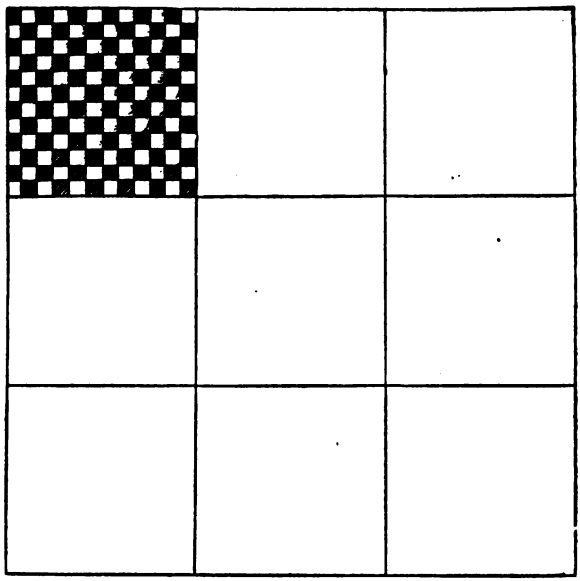
A grocer sold $\frac{3}{5}$ of a barrel of apples on Monday, and $\frac{1}{4}$ on Tuesday; what part of the barrel remained unsold?

Look at the circle and find answers:

$\frac{5}{20}$ are how many fourths? $\frac{1}{5}$ of the circle is found in $\frac{4}{20}$ how many times?
$\frac{10}{20}$ are how many fourths?
$\frac{15}{20}$ are how many fourths? $\frac{1}{5}$ is found in $\frac{1}{4}$?
$\frac{12}{20}$ are how many fifths? $\frac{10}{20}$ contains $\frac{2}{20}$?
$\frac{14}{20}$ are how many tenths? $\frac{16}{20}$ contains $\frac{3}{20}$ how many times?

15. SQUARE MEASURE.

One square yard.



Mark off in the schoolyard a flower bed which shall measure a yard on each side.

Mark on the schoolroom floor, or on the blackboard, a square which shall measure a yard on each side. This is called a *square* yard.

Divide the square yard into 9 equal squares. Each one of these squares measures how much on each side?

Each one of these squares is called a *square foot.*

A square yard is how many square feet?

9 sq. ft. = 1 sq. yd.

1 square foot is what part of 1 square yard?

If you should set out 9 geraniums in a garden bed a yard square, how much ground could you allow for each plant, allowing the same amount for each? (Drawing.)

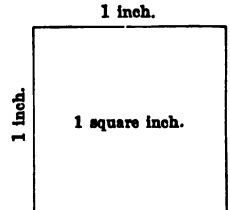
How many square feet in 2 square yards? How many square feet in 3 square yards?

Draw upon the board, or upon the floor of the school, 3 *square feet;* inclose a space 3 feet square. Which is the larger space? How many times as large?

Draw and compare 2 square feet with a space 2 feet square.

16. Cut out of paper, a square which is 1 foot on each side. How many inches is it on each side?

Cut a square, which is *one inch* on each side. This is called a *square inch.*



This figure represents a square inch of real size.

Fold your square foot of paper into square inches.

First, into how many 1-inch strips shall you fold it?

One square foot is how many square inches?

1 sq. ft. = 144 sq. in.

Inclose a space upon your slate, or upon the board, which shall be 1 foot square. Divide this square foot into square inches. Find out how many small squares of patchwork, each four inches square, can be cut from a square foot of calico.

How many can be cut from a square yard of calico?

My slate is 9 inches long and 7 inches wide; how many square inches of surface has it? There are 7 rows of 9 square inches. 7 times 9 square inches = 63 square inches.

Find the area (surface) of a flower bed which is 6 feet long and 2 feet wide.

The length of a flower bed is 5 feet; the area 15 square feet. What is the width? (Drawing.)

17. MISCELLANEOUS PROBLEMS.

1. How many days in 9 weeks?

2. How many 6-inch pencils can you cut from 54 inches of lead?

3. The minute hand goes round the dial in an hour; how many minutes is it in passing over $\frac{1}{12}$ of this space?

4. How many square feet in $6\frac{1}{3}$ square yards?

5. A confectioner put up 52 pounds of candy in 8 boxes of equal size; how many pounds in each box?

6. The water in a tank is 51 inches deep; how many feet deep is it?

7. $7\frac{1}{2}$ pecks of beans are how many quarts?

8. Bessie had 54 cents; she spent 9 cents for envelopes. The remainder of her money will pay for how many street car rides, if she pays 5 cents each time?

9. A farmer having 56 bushels of potatoes, planted $\frac{1}{7}$ of them; how many bushels did he plant? How many pecks? How many bushels had he left?

10. Frank had 70 cents; he spent $\frac{1}{7}$ of it for a ball of twine, $\frac{1}{7}$ for some nails, and with the remainder he bought a reader; what did his reader cost?

11. If a cook uses 6 eggs each day, how many days will five dozen last?

12. How many sides have two triangles? How many plants will be needed for two triangular garden plats, if 9 are planted on each side? (Draw.)

13. If a man works at his trade nine hours a day, how many hours does he work in a week?

14. 16 bushels of oats are how many pecks?

15. I bought eight yards of muslin at 7 cents a yard, and gave in payment a fifty-cent piece and a ten-cent piece; what change ought I to receive?

18. ADDING AND SUBTRACTING 5's.

Add 5 to numbers below 100, which end in 5.

Subtract 5 from numbers ending in 0.

Make tables, subtracting 5 from numbers ending in 1 and numbers ending in 2.

19. 5 + 6.

5	15	25	35	45	55	65	75	85	95
6	6	6	6	6	6	6	6	6	6

(1)	(2)	(3)	(4)	(5)	(6)
536	266	694	594	598	964
554	544	557	692	657	798
656	556	654	887	454	457
455	654	265	446	559	754
561	465	725	95	656	489
543	545	645	769	982	835
655	556	565	625	694	496
445	634	42	843	848	758
644	426	487	89	87	458
142	665	67	64	74	54

Add:

(7) 444, 788, 656, 565, 989, 936, 482, 744, 568, 7, 54.

(8) 99, 459, 855, 595, 644, 976, 65, 626, 848, 89, 53.

(9) 75, 896, 559, 60, 696, 982, 444, 688, 655, 57, 859.

(10) 458, 764, 997, 456, 762, 534, 678, 745, 756, 57, 3.

20. 5 + 7.

5	15	25	35	45	55	65	75	85	95
7	7	7	7	7	7	7	7	7	7

(1)	(2)	(3)	(4)	(5)	(6)
567	312	553	469	495	354
537	735	525	795	898	557
753	375	735	986	975	585
355	535	355	748	756	526
757	557	755	275	389	959
373	753	335	475	75	147
535	377	555	855	726	743
555	533	651	581	847	494
583	876	958	68	87	299
254	516	778	8	57	359

21. MISCELLANEOUS PROBLEMS.

1. Two numbers, taken together, make 1000. One of the numbers is 320; what is the other number?

2. Find the difference between 534 and 3034.

3. Subtract 12 from 1000.

4. An excursion train left Chicago for Niagara Falls with 543 passengers. On the way 254 passengers left the cars and 162 came aboard; how many were on the train when it reached Niagara Falls?

5. Morris paid 50 cents for a hammer, $1.25 for a saw, 75 cents for a file, 25 cents for a gimlet, 25 cents for a screw driver, $1 for an auger, 50 cents for a chisel, and $2 for a plane; how much

did his tools cost him? If he should sell them for $6, would he gain or lose?

Add:

(6) 789, 572, 757, 484, 979, 834, 548, 674, 668, 898.

(7) 457, 756, 973, 724, 596, 745, 485, 839, 579, 74.

(8) 479 + 620 + 799 + 239 + 497 + 775 + 48 + 797 + 872 + 99 + 4 = ?

Add:

(9) 79, 20, 745, 284, 497, 872, 954, 787, 844, 79, 59.

(10) 975, 726, 548, 875, 775, 239, 443, 878, 797, 775, 90.

Subtract 5, giving the ending figure of the result, and then the whole remainder.

11	22	33	44	55	66	77	88	99	101
5	5	5	5	5	5	5	5	5	5

32	24	53	41	60	82	91	73	54	102
5	5	5	5	5	5	5	5	5	5

61 − 5 = ?	94 − 5 = ?	63 − 5 = ?	92 − 5 = ?
72 − 5 = ?	70 − 5 = ?	54 − 5 = ?	33 − 5 = ?
83 − 5 = ?	81 − 5 = ?	71 − 5 = ?	64 − 5 = ?

Make tables subtracting 5 from numbers ending in 3 and 4.

22. 5 + 8.

5	15	25	35	45	55	65	75	85	95
8	8	8	8	8	8	8	8	8	8

(1)	(2)	(3)	(4)	(5)	(6)
325	225	455	799	297	589
855	555	555	578	855	898
255	255	385	888	485	942
558	355	225	55	874	984
452	835	555	988	447	978
855	225	555	499	869	429
225	855	865	955	88	857
558	555	201	447	652	542
852	353	555	75	785	89
543	345	437	6	68	4

Add:

(7) 979, 944, 577, 647, 962, 875, 225, 848, 2, 88, 955.

(8) 945, 973, 878, 223, 755, 274, 855, 955, 84, 89.

(9) 475, 647, 779, 247, 362, 875, 57, 878, 585, 89, 9.

(10) 75 + 426 + 858 + 962 + 289 + 528 + 872 + 824 + 648 + 87 + 54 = ?

Find the sum of:

(11) 859, 354, 46, 975, 98, 887, 25, 997, 79, 8, 4.

Add:

(12) 789, 290, 459, 878, 782, 437, 894, 53, 607, 6, 5.

23. Subtract:

(1)	(2)	(3)	(4)	(5)	(6)
5514	5065	7617	7748	8119	8094
1445	5050	3455	3055	5505	4345

7. 9000 — 1445 = ?
8. 8000 — 4405 = ?
9. 3111 — 2445 = ?
10. 5111 — 2405 = ?
11. 7011 — 4435 = ?
12. 9112 — 4345 = ?
13. 8122 — 4435 = ?
14. 5333 — 1045 = ?
15. 7303 — 4045 = ?
16. 4313 — 4144 = ?
17. 5113 — 4245 = ?
18. 9313 — 4344 = ?
19. 7414 — 4425 = ?
20. 4444 — 3345 = ?
21. 9041 — 4445 = ?
22. 8041 — 1445 = ?
23. 5414 — 1415 = ?
24. 8434 — 1435 = ?

24. MISCELLANEOUS PROBLEMS.

1. The sum of 3 numbers is 1345. Two of the numbers are 300 and 400; what is the third?

2. From a cask containing 900 gallons of kerosene I sold at different times 200 gallons, 165 gallons, and 150 gallons; how many gallons remained in the cask?

3. A gentleman bought a 1000-mile ticket on a railroad for the use of his wife, his daughter, his son, and himself. His wife rode 233 miles, his daughter 289 miles, his son 221, and he himself rode the remainder; how many miles did he ride?

4. A farmer raised 225 bushels of blue grass seed. He sowed 74 bushels, and sold 95 bushels; how many bushels had he left?

5. A has \$639, B has \$865, C has \$786, and D has as much as A, B, and C; how many dollars has D?

6. A has \$2400, B has \$500 less than A, C has \$150 less than B; how much money has C?

25. REVIEW.

Add:

(1) 88, 492, 744, 799, 277, 558, 772, 534, 887, 87, 65.

(2) 599, 540, 489, 775, 957, 898, 388, 745, 764, 88, 88.

(3) 544 + 868 + 454 + 334 + 558 + 663 + 854 + 156 + 594 + 288 = ?

(4) 989, 587, 659, 884, 497, 958, 52, 598, 844, 68, 65.

(5) 878 + 925 + 848 + 89 + 295 + 975 + 424 + 989 + 529 + 98 + 973 = ?

(6) 799, 947, 864, 577, 959, 795, 495, 844, 577, 58, 4.

(7) 559, 675, 576, 543, 76, 345, 975, 34, 486, 98, 965 = ?

Find differences:

1. 9453 — 545 = ?
2. 8453 — 544 = ?
3. 9341 — 5445 = ?
4. 8341 — 5345 = ?
5. 9623 — 3545 = ?
6. 8441 — 5045 = ?
7. 7422 — 5435 = ?
8. 4643 — 3004 = ?
9. 6341 — 4345 = ?
10. 7334 — 3025 = ?
11. 7344 — 3545 = ?
12. 6412 — 4534 = ?
13. 3323 — 2554 = ?
14. 9203 — 3405 = ?
15. 8801 — 134 = ?

26. 5 + 9.

5	15	25	35	45	55	65	75	85	95
9	9	9	9	9	9	9	9	9	9

(1)	(2)	(3)	(4)	(5)
797	958	87	768	355
950	885	590	55	478
545	878	855	557	587
457	559	87	495	55
575	949	995	954	967
84	750	4	569	98
895	565	775	45	755
55	947	957	479	889
497	787	79	89	898
67	655	598	82	62
		85		

27. Add:

(6) 895, 258, 978, 45, 554, 645, 546, 795, 606, 8, 4.

(7) 958, 545, 758, 789, 478, 959, 570, 295, 906, 59, 4.

(8) 989, 959, 575, 487, 55, 597, 897, 905, 897, 687, 75.

(9) 895, 587, 798, 855, 566, 855, 975, 989, 589, 95.

(10) 989, 455, 464, 955, 587, 768, 555, 789, 587, 898, 75.

(11) 989, 597, 855, 867, 558, 485, 986, 505, 798, 597, 74.

(12)	(13)	(14)	(15)	(16)	(17)
325	515	585	995	959	899
598	959	515	587	575	575
512	151	954	798	689	856
955	555	151	455	552	789
195	599	959	787	784	585
915	911	191	378	499	897
255	155	515	595	585	594
457	535	995	556	348	854
575	287	277	688	787	89
977	242	347	565	465	65

28. MISCELLANEOUS PROBLEMS.

1. In what year was your schoolhouse built? How many years have passed since that time?

How many years have passed since the discovery of America by Columbus in 1492?

2. How many 6-inch squares can be cut from 1 square foot of pasteboard? (Draw the square foot, and divide into square inches. Draw the 6-inch squares.)

3. A farmer went to town with a load of wood, which he sold for $8. He bought 25 pounds of

sugar for $2, 8 pounds of raisins for $1, 2 pounds of tea for $1.50, and 6 pounds of coffee for $2.10; how much did he spend? Did he sell his wood for enough to pay for his groceries?

4. A grocer bought 50 barrels of apples and 100 boxes of peaches, for which he paid $225. If he paid $75 for the peaches, how much did he pay for the apples?

5. Bought 4 lb. butter, @ 22 ¢ . . . . $
" 2 lb. cheese, " 18 ¢ . . . .
" 3 doz. eggs, " 15 ¢ . . . .
" 9 qt. milk, " 6 ¢ . . . .
" 2 bu. potatoes, " 65 ¢ . . . .
" 2 bu. carrots, " 60 ¢ . . . .

What is the amount of my bill?

6. Bought 9 lb. rice, @ 7 ¢ . . . . . $
" 2 " tapioca, " 15 ¢ . . . . .
" 3 " sago, " 13 ¢ . . . . .
" 5 " sugar, " 9 ¢ . . . . .
" 7 " prunes, " 9 ¢ . . . . .
" 3 " figs, " 15 ¢ . . . . .

What is the amount of my bill?

7. Bought 4 lb. tea, @ $1.25 . . . . $
" 2 " coffee, " .42 . . . .
" 4 " raisins, " .11 . . . .
" 7 " currants, " .09 . . . .
" 5 " crackers, " .12 . . . .
" 7 " sugar, " .08 . . . .

What is the whole amount?

8.

Chicago, Jan. 14, 1890.

Mr. James Hall,

Bought of B. F. Allen & Co.,

6 papers garden seeds, @ 9 ¢	*$ .54*
2 willow baskets, @ 45 ¢	*.90*
1 hammock	*4.80*
1 lawn mower	*6.75*
1 rake	*.80*
1 spade	*1.25*

Received payment,

B. F. Allen & Co.

9.

NASHVILLE, TENN., Feb. 10, 1899.

Mr. JOHN MITCHELL,

Bought of J. D. HUNT & Co.,

2 lb. coffee, @ 32 ¢	$
6 " crackers, " 11 ¢	
3 " honey, " 18 ¢	
1 " Japan tea	.98
1 doz. oranges	.40
1 sack flour	3.89

Received payment,

J. D. HUNT & CO.

29. REVIEW.

Read sums rapidly:

32	42	52	62	83	93	63	53	43	33	103
8	6	9	7	9	6	8	7	5	9	8

44	54	64	74	85	95	65	35	25	105
9	6	8	7	9	7	8	6	9	7

Add:

5, 9, 9, 2, 9, 9, 8, 4, 9, 8, 2, 7, 3, 9, 7, 9.
9, 9, 4, 9, 9, 5, 9, 7, 4, 8, 2, 9, 7, 7, 2, 2.
7, 5, 8, 9, 5, 8, 9, 4, 9, 7, 4, 6, 4, 7, 0, 8.
9, 5, 8, 9, 7, 5, 4, 5, 3, 9, 8, 4, 5, 3, 0, 7.
3, 9, 4, 4, 6, 1, 4, 6, 4, 3, 5, 3, 9, 4, 4, 3, 2, 5, 3.
4, 7, 6, 2, 3, 8, 9, 1, 5, 4, 1, 7, 4, 8, 2, 6, 4, 3, 5.
9, 9, 2, 9, 2, 9, 7, 4, 5, 4, 6, 4, 5, 4, 1, 9, 3, 8.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
854	697	576	797	799	436	478	975
376	482	648	346	423	644	584	476
785	748	542	553	853	751	558	729
456	284	345	474	124	244	867	589
755	459	856	426	489	865	984	593
556	789	464	745	534	496	949	549
752	429	984	585	928	724	579	685
596	789	459	259	296	998	844	548
756	687	695	389	988	713	859	895
456	757	659	534	464	249	679	245

(9) 798 + 557 + 789 + 985 + 557 + 78 + 895 + 559 + 849 + 96 + 85 = ?

Add:

(10) 589, 457, 855, 587, 658, 545, 758, 89, 599, 99, 54.
(11) 58, 79, 594, 957, 85, 474, 545, 874, 689, 77, 8.
(12) 599, 759, 575, 557, 254, 788, 357, 785, 587, 78, 4.
(13) 557, 640, 555, 579, 459, 808, 879, 955, 909, 87, 4.
(14) 45, 575, 678, 554, 508, 370, 757, 545, 959, 86, 54.
(15) 987, 895, 956, 967, 485, 54, 875, 580, 97, 9, 3.

CHAPTER VI.

NUMBERS FROM SEVENTY TO ONE HUNDRED.

1. Harry drew 72 lines upon his slate to represent lamp posts: how many *twelves* did he draw?

72 is how many 12's? 12 is what part of 72? 72 is how many times $\frac{1}{6}$ of 72?

$72 \div 12 = ?$ $6 \times 12 = ?$ $\frac{1}{6}$ of $72 = ?$

I paid \$12, which was $\frac{1}{6}$ of my money, for some peach trees; how much money had I at first?

Divide the 72 posts into 12 equal groups. 72 is how many 6's?

$72 \div 6 = ?$ $12 \times 6 = ?$ $\frac{1}{12}$ of $72 = ?$

How many clocks can you buy for \$72, at \$6 each?

Make problems for:

$6 \times 12 = 72.$ $12 \times 6 = 72.$ $72 \div 6 = 12.$ $\frac{1}{12}$ of $72 = 6$

2. Draw 72 walnuts: divide them into 8 equal groups. How many in each group? 72 is how many 9's? Eight 9's are how many? One of the 8 equal parts of 72 equals what? How many of these parts make the whole?

$72 \div 9 = ?$ $8 \times 9 = ?$ $\frac{1}{8}$ of $72 = ?$

8 times $\frac{1}{8}$ of $72 = ?$ $\frac{3}{8}$ (or $\frac{1}{4}$) of $72 = ?$ $\frac{3}{8}$ of $72 = ?$

Put 72 bunches of grapes into 8 baskets; what part of the whole will each basket contain, if the grapes are divided equally?

Divide the 72 walnuts into 9 equal groups; how many in each group?

$72 \div 8 = ?$ $9 \times 8 = ?$ $\frac{1}{9}$ of $72 = ?$

8 cents are what part of 72 cents? 72 cents are how many times $\frac{1}{8}$ of 72 cents?

Put 72 pounds of figs into 9 boxes of equal size; each box will contain how many pounds?

Divide 72 into eighteens. 4 eighteens are how many? How long will a man be in earning $72 who receives $18 a week?

3. REVIEW.

At 9 cents a pound, how many pounds of prunes can be bought for 72 cents?

6 miles is $\frac{1}{12}$ of my journey; what is the whole distance?

75 cents will buy how many street car tickets, at 5 cents each?

I bought 2 yards of flannel for 75 cents; how much was that a yard?

If a man earn $15 a week, how long will it take him to earn $75?

Jennie's age is only $\frac{1}{6}$ the age of her grandfather, who is 75 years old; how old is Jennie?

Make problems for:

75 miles ÷ 6 miles = $12\frac{1}{2}$ (times).
75 miles ÷ 6 = $12\frac{1}{2}$ miles.

4. 77 is how many elevens? $77 \div 11 = ?$ $7 \times 11 = ?$ $\frac{1}{7}$ of $77 = ?$

A dealer in china paid $11 a set for 7 sets of dishes; how much did they cost him?

77 days are how many weeks?

$77 \div 7 = ?$ $11 \times 7 = ?$ $\frac{1}{11}$ of $77 = ?$

5. 80 is how many tens? $80 \div 10 = ?$ $8 \times 10 = ?$ $\frac{1}{8}$ of $80 = ?$

A farmer having 80 bushels of apples sold $\frac{1}{8}$, used $\frac{1}{8}$, and stored the remainder; how many bushels were stored?

80 is how many eights? $80 \div 8 = ?$ $10 \times 8 = ?$ $\frac{1}{10}$ of $80 = ?$ Ten times $\frac{1}{10}$ of $80 = ?$

6. 81 nails are how many 9-nails? $81 \div 9 = ?$ $9 \times 9 = ?$ 9 times $\frac{1}{9}$ of $81 = ?$

Draw 9 squares, and divide each one into 9 equal squares; how many small squares are there?

How many square feet in 9 square yards?

7. 84 equals how many 12's? 84 eggs are how many dozen? $84 \div 12 = ?$ $7 \times 12 = ?$ 12 is what part of 84? 84 inches are how many feet?

If \$12 is $\frac{1}{7}$ of the cost of my bookcase, what was the cost?

84 equals how many 7's? 84 days are how many weeks? 7 is what part of 84?

I paid 84 cents for a dozen papers of flower seeds; how much was that for each paper?

Make problems for:

$12 \times 7 = 84$. $84 \div 7 = 12$. $\frac{1}{12}$ of $84 = 7$.

8. Draw 88 circles to represent buttons; how many 11's have you? $88 \div 11 = ?$ $8 \times 11 = ?$ 11 is what part of 88?

If \$11 is $\frac{1}{8}$ the cost of John's pony, what was the cost?

88 is how many 8's? 8 bushels are what part of 88 bushels? 88 quarts are how many pecks?

$88 \div 8 = ?$ $11 \times 8 = ?$ $\frac{1}{11}$ of $88 = ?$

If a wagon load of potatoes is 8 bushels, how many bushels in 8 wagon loads?

9. REVIEW.

$7 \times 12 = ?$	$80 \div 8 = ?$	$\frac{1}{11}$ of $77 = ?$	$12 \times 7 = ?$
$11 \times 7 = ?$	$77 \div 7 = ?$	$\frac{1}{8}$ of $81 = ?$	$11 \times 8 = ?$
$10 \times 8 = ?$	$88 \div 11 = ?$	$\frac{1}{8}$ of $80 = ?$	$81 \div 9 = ?$
$9 \times 9 = ?$	$84 \div 7 = ?$	$\frac{1}{12}$ of $84 = ?$	$\frac{1}{11}$ of $88 = ?$

A boy spent $\frac{1}{8}$ of his money for a knife, and had 70 cents left; how much money had he at first?

A gardener set out 77 plants, of which $\frac{1}{7}$ were killed by the frost; how many were uninjured?

A cooking range cost \$81, and a small stove $\frac{1}{3}$ as much; what was the cost of the stove?

90 is how many 10's? $9 \times 10 = ?$ $\frac{1}{10}$ of $90 = ?$

90 is how many 9's? 9 is what part of 90?

90 cents are how many dimes?

At \$9 a dozen, what will 10 dozen hats cost?

10. 96 is how many 12's? 96 oysters are how many dozen? $8 \times 12 = ?$ $\frac{1}{8}$ of $96 = ?$

At 12 cents a pound, how many pounds of maple sugar can be bought for 96 cents? $12 \times \frac{1}{8}$ of $96 = ?$

Divide 96 leaves into 12 equal groups; how many in each group? $12 \times 8 = ?$ $\frac{1}{12}$ of $96 = ?$

Plant 96 tomato plants in 12 equal rows; how many in each row?

11. Mary drew some snow stars on her slate, and found that she had 9 rows and 11 in each row; how many had she? 99 is how many 11's? $\frac{1}{9}$ of $99 = ?$

Ella worked 11 button holes in one apron; how many will be required for 9 aprons, if each requires the same number?

Divide 99 into 11 equal groups; how many in each group?

99 is how many 9's? 11 nines are how many?

If Harry plants 9 grains of corn in each of 11 hills; how many grains does he plant?

Make problems for:

$\frac{1}{11}$ of $99 = 9$. $11 \times 9 = 99$. $9 \times 11 = 99$.

12. Divide 100 silver dollars into tens. \$10 are what part of \$100? 100 cents are how many dimes?

George spent $\frac{1}{10}$ of a dollar for a ball, $\frac{2}{10}$ for a knife, and $\frac{6}{10}$ for a picture frame; how many cents did he spend? How much money had he left?

50 cents is what part of a dollar? $\frac{1}{2}$ of 50 cents is what part of \$1? $\frac{1}{4}$ of \$1 is how many cents? $\frac{1}{5}$ of 100 cents is how many cents?

If I pay \$1 for 3 pounds of coffee, how many cents is that a pound?

At 20 cents a pound, how many pounds of butter can be bought for \$1?

I bought 6 dozen eggs at the rate of $8\frac{1}{3}$ cents a dozen; how much did I pay for them?

8 cans of corn at $12\frac{1}{2}$ cents a can cost how much?

13. REVIEW.

$10 \times 9 = ?$	$5 \times 20 = ?$	$\frac{1}{8}$ of $100 = ?$	$99 \div 9 = ?$
$12 \times 8 = ?$	$3 \times 33\frac{1}{3} = ?$	$\frac{1}{6}$ of $100 = ?$	$100 \div 15 = ?$
$11 \times 9 = ?$	$8 \times 12 = ?$	$\frac{1}{8}$ of $96 = ?$	$96 \div 12 = ?$

8 dozen foliage plants were used in the border of a garden walk; how many were used?

At 15 cents a yard, how many yards of canton flannel can be bought for $1?

My fuel costs me $96 a year; how much is that a month?

At $12\frac{1}{2}$ cents a can, how many cans of tomatoes can be bought for $1?

Make problems for:

$\frac{1}{8}$ of $96 = 12$.	$\frac{1}{9}$ of $99 = 11$.	$\frac{1}{8}$ of $100 = 12\frac{1}{2}$.
$8 \times 12\frac{1}{2} = 100$.	$12 \times 8\frac{1}{3} = 100$.	$96 \div 12 = 8$.
$96 \div 8 = 12$.	$100 \div 3 = 33\frac{1}{3}$.	$100 \div 15 = 6\frac{2}{3}$.

14. Complete and learn:

$72 \div 12 = 6$.	$6 \times 12 = ?$	$84 \div 12 = 7$.	$7 \times 12 = ?$
$\div 6 = 12$.	$12 \times 6 = ?$	$88 \div 11 = 8$.	$8 \times 11 = ?$
$\div 9 = 8$.	$8 \times 9 = ?$	$\div 8 = 11$.	$11 \times 8 = ?$
$\div 8 = 9$.	$9 \times 8 = ?$	$90 \div 10 = 9$.	$9 \times 10 = ?$
$77 \div 11 = 7$.	$7 \times 11 = ?$	$\div 9 = 10$.	$10 \times 9 = ?$
$\div 7 = 11$.	$11 \times 7 = ?$	$96 \div 12 = 8$.	$8 \times 12 = ?$
$80 \div 10 = 8$.	$8 \times 10 = ?$	$\div 8 = 12$.	$12 \times 8 = ?$
$\div 8 = 10$.	$10 \times 8 = ?$	$99 \div 11 = 9$.	$9 \times 11 = ?$
$81 \div 9 = 9$.	$9 \times 9 = ?$	$\div 9 = 11$.	$11 \times 9 = ?$
$84 \div 7 = 12$.	$12 \times 7 = ?$	$100 \div 10 = 10$.	$10 \times 10 = ?$

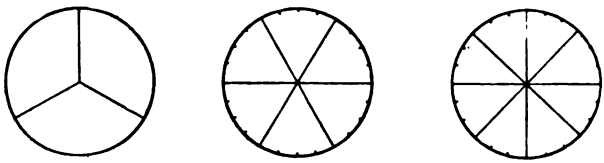
15. REVIEW OF TABLES.

$1 \times 2 = 2$	$1 \times 3 = 3$	$1 \times 4 = 4$
$2 \times 2 = 4$	$2 \times 3 = 6$	$2 \times 4 = 8$
$3 \times 2 = 6$	$3 \times 3 = 9$	$3 \times 4 = 12$
$4 \times 2 = 8$	$4 \times 3 = 12$	$4 \times 4 = 16$
$5 \times 2 = 10$	$5 \times 3 = 15$	$5 \times 4 = 20$
$6 \times 2 = 12$	$6 \times 3 = 18$	$6 \times 4 = 24$
$7 \times 2 = 14$	$7 \times 3 = 21$	$7 \times 4 = 28$
$8 \times 2 = 16$	$8 \times 3 = 24$	$8 \times 4 = 32$
$9 \times 2 = 18$	$9 \times 3 = 27$	$9 \times 4 = 36$
$10 \times 2 = 20$	$10 \times 3 = 30$	$10 \times 4 = 40$
$11 \times 2 = 22$	$11 \times 3 = 33$	$11 \times 4 = 44$
$12 \times 2 = 24$	$12 \times 3 = 36$	$12 \times 4 = 48$

$1 \times 5 = 5$	$1 \times 6 = 6$	$1 \times 7 = 7$
$2 \times 5 = 10$	$2 \times 6 = 12$	$2 \times 7 = 14$
$3 \times 5 = 15$	$3 \times 6 = 18$	$3 \times 7 = 21$
$4 \times 5 = 20$	$4 \times 6 = 24$	$4 \times 7 = 28$
$5 \times 5 = 25$	$5 \times 6 = 30$	$5 \times 7 = 35$
$6 \times 5 = 30$	$6 \times 6 = 36$	$6 \times 7 = 42$
$7 \times 5 = 35$	$7 \times 6 = 42$	$7 \times 7 = 49$
$8 \times 5 = 40$	$8 \times 6 = 48$	$8 \times 7 = 56$
$9 \times 5 = 45$	$9 \times 6 = 54$	$9 \times 7 = 63$
$10 \times 5 = 50$	$10 \times 6 = 60$	$10 \times 7 = 70$
$11 \times 5 = 55$	$11 \times 6 = 66$	$11 \times 7 = 77$
$12 \times 5 = 60$	$12 \times 6 = 72$	$12 \times 7 = 84$

$1 \times 8 = 8$	$1 \times 9 = 9$	$1 \times 10 = 10$
$2 \times 8 = 16$	$2 \times 9 = 18$	$2 \times 10 = 20$
$3 \times 8 = 24$	$3 \times 9 = 27$	$3 \times 10 = 30$
$4 \times 8 = 32$	$4 \times 9 = 36$	$4 \times 10 = 40$
$5 \times 8 = 40$	$5 \times 9 = 45$	$5 \times 10 = 50$
$6 \times 8 = 48$	$6 \times 9 = 54$	$6 \times 10 = 60$
$7 \times 8 = 56$	$7 \times 9 = 63$	$7 \times 10 = 70$
$8 \times 8 = 64$	$8 \times 9 = 72$	$8 \times 10 = 80$
$9 \times 8 = 72$	$9 \times 9 = 81$	$9 \times 10 = 90$
$10 \times 8 = 80$	$10 \times 9 = 90$	$10 \times 10 = 100$
$11 \times 8 = 88$	$11 \times 9 = 99$	$11 \times 10 = 110$
$12 \times 8 = 96$	$12 \times 9 = 108$	$12 \times 10 = 120$

16. COMPARISON OF THIRDS, SIXTHS, AND EIGHTHS.



Which is more, $\frac{1}{3}$ of a dollar or $\frac{1}{6}$? $\frac{1}{3}$ of a yard or $\frac{1}{6}$ of a yard? $\frac{1}{6}$ of a dollar or $\frac{1}{8}$?

$\frac{1}{6}$ of a dollar is how many cents? $\frac{1}{8}$ of a dollar is how many cents?

Into how many parts is the third circle divided by the lines? Draw this circle upon your slate, and divide each *eighth* into 3 equal parts.

Into how many parts is the whole circle divided? One of these parts is called what?

$\frac{1}{8}$ is equal to how many twenty-fourths of the whole circle? $\frac{2}{8}$ are how many twenty-fourths?

Draw the second circle, which is divided into 6 equal parts. Divide each sixth into 4 equal parts. $\frac{1}{6}$ is how many twenty-fourths of the whole circle? $\frac{2}{6}$ are how many twenty-fourths of the whole?

$\frac{1}{3}$ is how many twenty-fourths? $\frac{2}{3}$ are how many twenty-fourths?

Look at the first and second circles shown on this page. What part of $\frac{1}{3}$ is $\frac{1}{6}$? What part of $\frac{1}{2}$ is $\frac{1}{3}$? What part of $\frac{2}{3}$ is $\frac{1}{2}$?

17. Draw a circle, and divide it into 24 equal parts. From your circle find the answers to these questions:

$\frac{1}{4} + \frac{1}{8}$ equals how many twenty-fourths?

$\frac{1}{3} + \frac{1}{8}$ equals how many twenty-fourths?

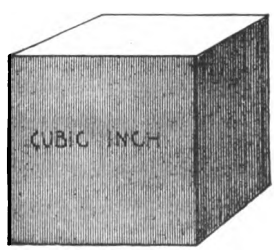
$\frac{5}{8} + \frac{2}{3} = ?$ $\frac{3}{8} + \frac{1}{8} = ?$ $\frac{7}{8} + \frac{1}{8} = ?$ $\frac{2}{3} + \frac{1}{8} = ?$

$\frac{1}{3}$ of $\frac{1}{8}$ of the circle is how many twenty-fourths of the whole? $\frac{1}{4}$ of $\frac{1}{6}$ is what part of the whole? $\frac{1}{8}$ of $\frac{1}{3} = ?$

I need $\frac{1}{6}$ of a yard of velvet for dress trimming and $\frac{1}{8}$ of a yard for a satchel; what part of a yard must I buy for both?

18. CUBIC MEASURE.

How many faces has a cube? What is the form of each face?



How many edges has a cube?

How many corners has a cube?

Find a cube whose edges are each one inch long.

A cube whose edges are each one inch long is called a cubic inch.

Build a post of 1-inch cubes; how high a post will 3 such cubes make? One cubic inch is what

part of the post? 2 cubic inches are what part of the post?

How many *square* inches in the front face of the post?

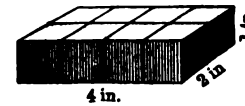
How many cubic inches in 2 posts, if each contains 4 cubic inches?

19. 1. Make a post of one-inch cubes; how high a post will 4 such cubes make? How many square inches in the front face of the post? One cubic inch is what part of the post? 2 cubic inches are what part of the post?

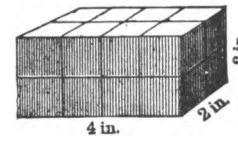
2. How many one-inch cubes in a block 3 inches long, 3 inches wide, and 3 inches high? (Build with blocks.) How many 1-inch cubes in $\frac{1}{3}$ of the block? How many square inches in one of its faces?

3. How many cubic inches in a block of wood 4 inches long, 1 inch wide, and 1 inch thick?

4. How many cubic inches in a block 4 inches long, 2 inches wide, and 1 inch thick? How many rows of 4 cubic inches each?



5. How many cubic inches in a block 4 inches long, 2 inches wide, and 2 inches thick?



2 × 4 cubic inches = 8 cubic inches.
2 × 8 cubic inches = 16 cubic inches.

6. Build a solid 4 inches long, 4 inches wide, and 4 inches high; how many cubic inches will it contain? How many square inches in one of its faces? Measure the distance round it.

7. How many 1-inch cubic blocks can you pack in a box which is 4 inches long, 4 inches wide, and 4 inches high?

8. How many 1-inch cubes of candy can you place in a box 6 inches long, 4 inches wide, and 4 inches high, measuring on the inside of the box?

9. Build a solid of one-inch cubes which shall be 12 inches long, 12 inches wide, and 1 inch high; how many cubes did you use?

20. MISCELLANEOUS PROBLEMS.

1. At the rate of 72 pages in 9 days, how many pages do I read in a day?

2. Ten cents, which Horace paid for his drawing book, was one-eighth of his money; how much had he?

3. A florist having 7 dozen roses, sold one-fourth of them; how many did he sell?

4. If a peck of berries cost 96 cents, what is that a quart?

5. If you have collected 8 dozen stamps, of which $\frac{1}{8}$ are 6-cent stamps, how many 6-cent stamps have you?

6. If 5 cents is paid for a cup of coffee, 4 cents for fish, and 2 cents for bread, what will 6 such breakfasts cost?

7. If I earn 54 dollars a month, and save $\frac{1}{6}$ of it, in how many months will I save 72 dollars?

8. How many 10-dollar bills must I pay for a mirror that cost 100 dollars?

9. How many inches in 8 feet?

10. 6 dozen rosebuds will be enough for how many bouquets, if 9 are used for each one?

11. If it takes 96 tiles for a fireplace, how many dozen does it take?

12. I bought 2 pairs of scissors for 75 cents; what was the cost of 1 pair?

13. A sheet of paper which is 8 inches wide, has a surface of 96 square inches; find the length.

14. What will a roast of 6 pounds of beef cost, at $12\frac{1}{2}$ cents a pound?

15. The transom above the door is 3 feet long and 2 feet wide. How many panes of glass will it require, if each pane is 1 foot square? (Draw picture.)

16. How many cubic inches in a block of wood which is 7 inches long, 4 inches wide, and 2 inches thick? (Drawing.) If the block were 3 inches thick, how many cubic inches? Four inches thick, how many cubic inches?

21. REVIEW.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
789	889	989	897	759	859	879
549	984	878	599	874	579	499
799	459	589	844	598	798	959
893	999	759	989	848	949	898
599	897	995	989	874	475	495
939	305	409	499	489	989	89
982	979	998	753	949	949	849
696	954	895	897	498	989	795
895	579	89	764	89	58	989
79	68	679	89	965	695	758

(8)	(9)	(10)	(11)	(12)	(13)	(14)
998	985	989	854	984	859	949
989	499	898	878	757	589	958
898	798	459	579	598	897	489
549	59	789	959	789	899	759
794	894	895	898	845	945	875
489	989	489	475	589	489	949
737	548	958	749	989	989	589
899	978	879	878	594	984	898
657	589	898	987	898	609	859
98	876	756	876	89	89	795

(15)	(16)	(17)	(18)	(19)	(20)	(21)
9	9	93	85	4	99	98
74	90	488	804	853	868	853
947	344	659	928	836	924	369
40	477	774	545	449	848	985
849	493	595	834	976	349	54
489	989	659	958	44	854	477
783	498	544	75	874	245	765
433	829	698	784	393	664	644
698	495	598	899	997	979	877
758	979	857	97	587	79	79

Subtract:

1. 9801 — 534 = ?	6. 7640 — 2534 = ?	11. 5101 — 4434 = ?
2. 8074 — 2135 = ?	7. 3141 — 2445 = ?	12. 8600 — 5534 = ?
3. 7004 — 1345 = ?	8. 3001 — 2154 = ?	13. 8122 — 6035 = ?
4. 9043 — 1534 = ?	9. 6011 — 5403 = ?	14. 5043 — 1415 = ?
5. 3842 — 1435 = ?	10. 3043 — 1415 = ?	15. 4312 — 243 = ?

22. MISCELLANEOUS PROBLEMS.

1. My slate has a surface of 72 square inches. It is 12 inches long; how wide is it?

2. If a man earn $8 a week, in how many weeks will he earn $96?

3. I lost $50 in selling a piano for $280; what was the value of the piano?

4. 8 men together paid $100 for some wheat; if they received equal shares of the wheat, what should each man pay?

5. A lady bought a bushel of sweet potatoes for $2.25, and gave in payment a five-dollar bill; how much change should she receive?

6. Bought 20 yards of carpet for $40, 30 yards of cloth for $75, and 2 pairs of curtains at $16 a pair; what did I pay for all?

7. A real estate agent bought some land for $2000; how much will he gain, if he divides the land into 4 lots, and sells them for $600 each?

8. If it takes one man 100 days to do a piece of work, in how many days could 2 men do the same work, working at the same rate?

9. If I pay 6 cents for the use of one dollar, what should I pay for the use of 5 dollars at the same rate? What must I pay for the use of 12 dollars?

10. I borrowed $100 for a year, and paid 6 cents on the dollar for its use. How much did I pay?

11. A car line is 5 miles long; if a car makes 12 round trips daily, how many miles will it run in ten days?

12. In a school of 45 pupils $\frac{7}{9}$ are present; how many are absent?

13. 5 gallons of cream were sold at ten cents a pint; how much money did it bring?

14. 2 lemons can be bought for 5 cents; at that rate, what is the cost of $2\frac{1}{2}$ dozen?

15. I have a box 6 inches long, 4 inches wide, and 2 inches deep; how many cubic inch blocks will it hold?

16. At 30 cents a peck, what will $2\frac{1}{2}$ bushels of apples cost?

17. My lot is 50 feet wide, and four times as long; how many yards of fence will enclose it?

18. What will 2 pounds 4 ounces of tea cost at 80 cents a pound?

PART II.

CHAPTER I.

1. READING AND WRITING NUMBERS.

What is the greatest number that can be expressed by four figures?

If you add *one* to *nine hundred ninety-nine*, how many ones have you? How many thousands? One thousand and nine thousands are how many thousands? How many ten-thousands?

NOTE. A box of Chinese toothpicks can be used in bundles of tens, hundreds, and thousands, to show the ten-thousand.

Write one thousand in figures. In what place does the figure 1 stand? If we wish to express a number ten times as great as 1000, how shall we represent it? One *ten*-thousand is ten times as great as one thousand. We express the 1 ten-

thousand by writing the figure 1 to the left of thousands, in ten-thousands' place; thus, 10,000.

Write 2 ten-thousands. 2 ten-thousands are how many ones? Write 3 ten-thousands and read the number in two ways. (How many thousands? How many ones?)

2. Read the following numbers:

30,000	25,400	15,021	10,010
50,000	36,303	21,048	11,001
90,000	47,350	16,743	15,005
41,000	54,707	28,096	15,015
65,000	90,900	11,110	99,999

How many ones in each of the last five numbers?

Write the following in figures (each two as one number):

27 thousand 600 ones.
70 thousand 350 ones.
6 thousand 70 ones.
80 thousand 8 ones.
30 thousand 500 ones.
60 thousand 70 ones.
95 thousand 200 ones.
8 thousand 8 ones.

3. Write in figures:

Seventeen thousand seven.
Twenty thousand two.
Eighty thousand eighty-one.
Twelve thousand twenty-one.
Eleven thousand one.
Eleven thousand one hundred ten.
Seventeen thousand seventeen.
Ninety thousand nine.
Twelve thousand twelve.
Fifty-six thousand one hundred fifty-six.
Ten thousand ten.
Eleven thousand eleven.

Read the following:

(D = 500. M = 1000.)

CC.	CCCL.	MDLXXX.
CCXIX.	CCCC.	MDCCCLXXX.
DCV.	MDL.	MDCCXCIX.
DCXV.	MDLIX.	MDCCCLXXXI.

4. MULTIPLICATION AND DIVISION.

Taking one number as many times as there are units in another, is called Multiplication.

Multiplication is a short method of finding the sum of two or more equal numbers.

Two times 24 cents are how many cents?

2 times \$80 = ? 2 times 396 = ?

Two times 6 ones are 12 ones. 12 ones equal 1 ten and 2 ones. Write the 2 ones in ones' place. 2 times 9 tens are 18 tens; adding 1 ten we have 19 tens, equal to 1 hundred and 9 tens. Write 9 tens in tens' place. 2 times 3 hundreds are six hundreds; adding one hundred we have 7 hundreds, which we write in hundreds' place. 2 times 396 equals 792.

396
2
792

Find the same result by addition, and notice the number of ones added; the number of tens, etc.

396 is called the *multiplicand;* it is the number to be multiplied.

2 is called the *multiplier;* it is the number which shows how many times the multiplicand is taken.

792 is called the *product;* it is the result obtained by multiplying.

The multiplicand and multiplier are called *factors* of the product.

The sign (×) of multiplication is read *multiplied by*, when the multiplier follows the multiplicand. $396 \times 2 = 792$ is read, 396 *multiplied by* 2 equals 792.

When the multiplier precedes the multiplicand, the sign is read *times*. $2 \times 396 = 792$ is read 2 *times* 396 = 792.

5. If a man travel 96 miles in a day, how far, at that rate, will he travel in 2 days?

96 miles, traveled in 1 day.
2, number of times 96 miles must be taken.
192 miles, traveled in 2 days.

At $2 a box, what will 87 boxes of lemons cost?

$2, cost of 1 box.
87, number of times $2 must be taken.
$174, cost of 87 boxes of lemons.

Make 87 the multiplier; multiply first by 7, then by 8.

6. Multiply by 2:

(1)	(2)	(3)	(4)	(5)	(6)	(7)
378	856	504	978	709	768	980
2	2	2	2	2	2	2

(8)	(9)	(10)	(11)	(12)	(13)
309	2023	986	4507	4659	4709
2	2	2	2	2	2

14. 2 multiplied by 468 = ?
15. 2 " 763 = ?
16. 2 " 849 = ?
17. 2 multiplied by 349 = ?
18. 2 " 786 = ?
19. 2 " 605 = ?

In the first example, which number is the multiplicand? In the last, which is the multiplicand? What are the factors of the product in the first example? What are the factors of the product in the tenth example?

7. Separating a number into equal parts is called Division.

How many times can 2 cents be taken out of 50 cents? How many times out of 80 cents? Out of 90 cents?

How many 2's can be taken out of 9 tens 8 ones?

Show with the counters that 45 twos can be taken out of 9 tens or 90 ones, and that 4 twos can be taken out of 8 ones. 49 twos can be taken out of 9 tens 8 ones.

Show that 9 tens (or 90) holds 2 ones 4 tens (or 40) times with 1 ten remaining. The one ten is equal to ten ones. Ten ones and 8 ones are 18 ones. 18 ones holds 2 ones 9 times.

How many 2's can be taken out of 972?

2 is contained in 9 hundred 4 hundred times, with 1 hundred remaining undivided, which is equal to 10 tens. 10 tens and 7 tens are 17 tens. 2 is contained in 17 tens 8 tens times, with 1 ten remaining, which is equal to 10 ones. 10 ones and 2 ones are 12 ones. 2 is contained in 12 ones 6 times. 2 can be taken out of 972 486 times, or 486 twos can be taken out of 972.

$$2\overline{)972}\quad 486$$

How many \$2 in \$972?

At \$2 a barrel, how many barrels of potatoes can be bought for \$972?

$2)$972

486, number of 2-dollars in $972.

486 barrels of potatoes, at $2 a barrel, can be bought for $972.

8. 972 is called the *dividend:* it is the number to be divided.

2 is called the *divisor:* it shows the size of the equal numbers into which the dividend is to be separated. A divisor is called an *exact divisor* when it is contained in the dividend without a remainder.

486 is called the *quotient:* it shows the number of equal numbers into which the dividend has been separated.

The divisor and quotient are *factors* (makers) of the dividend.

The product of the divisor and the quotient, plus the remainder, is equal to the dividend.

Division may be expressed or indicated by the sign (÷), or by writing the dividend over the divisor with a line between them. Each of the expressions, $24 \div 2 = 12$ and $\frac{24}{2} = 12$, may be read, 24 *divided by* 2 equals 12.

Divide by 2:

1. 7398	4. 8604	7. 7176	10. 2015
2. 8249	5. 7170	8. 1257	11. 4819
3. 9781	6. 9410	9. 6729	12. 9197

9. One half of 90 cents is how many cents?

Divide 9 dimes equally between 2 boys; how many dimes will each receive?

Find $\frac{1}{2}$ of 9 tens 8 ones.

$\frac{1}{2}$ of 9 tens is 4 tens, with 1 ten remaining, which is equal to ten ones. Ten ones and 8 ones are 18 ones. $\frac{1}{2}$ of 18 ones is 9 ones. One-half of 9 tens 8 ones is 49 ones. Show by counters.

A man divided \$972 equally between his two children; how much money did each receive?

2) \$972 money to be divided.
\$486 each child received.

10. Separate 400 into two equal parts; into five equal parts. Separating a number into a given number of equal parts is called *Partition.*

Find $\frac{1}{2}$ of:

1. 9875	3. 9347	5. 3098	7. \$8101	9. 7003 bushels.
2. 6001	4. 7190	6. 5729	8. \$7900	10. 5045 pecks.

11. 1. If a man travel 286 miles in 2 days, at that rate how far will he travel in *one* day?

2. A clock strikes 312 times in 2 days; how many times does it strike in 1 day?

3. How many times must we take the number 2 to make 652?

4. If a man earn \$2 a day, how long will it take him to earn \$550?

5. A bookseller paid \$114 for photograph albums at \$2 each; how many did he buy?

6. A gardener sold 750 strawberry plants, which was $\frac{1}{2}$ of all he had; how many had he?

7. What number multiplied by 2 will produce 1680?

12. MULTIPLYING AND DIVIDING BY 3.

Find the products of:

1. 3086×3	4. 3006×3	7. 3009×3	10. 4123×3
2. 3097×3	5. 3246×3	8. 2549×3	11. 2867×3
3. 2786×3	6. 3269×3	9. 3369×3	12. 3009×3

13. 3 multiplied by $2738 = ?$ 14. 3 multiplied by $3108 = ?$

Find the quotients of:

1. $3687 \div 3$	3. $7891 \div 3$	5. $2501 \div 3$	7. $9108 \div 3$
2. $3456 \div 3$	4. $5476 \div 3$	6. $7057 \div 3$	8. $8310 \div 3$

13. 1. How many 3-cents in 3564 cents?

2. How many yards in a coil of wire which contains 2500 feet?

3. What will 687 yards of cloth cost, at \$3 a yard?

4. A man earned \$12 a week and saved \$3; in how many weeks, at that rate, will he save \$450?

5. If a steamer can run 278 miles a day, how far can it run in 3 days?

6. \$241 is $\frac{1}{3}$ of my money; how much money have I?

7. Three times $\frac{1}{2}$ of \$300 is the price of a lot; what is the value of the lot?

8. Find dividends:

$3)\overline{241}$ $3)\overline{335}$ $3)\overline{35\frac{1}{3}}$ $3)\overline{680}$

How is the dividend found, when divisor and quotient are given? What are the factors of the dividend?

14. REVIEW.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
9	544	45	96	7	95	84	497
753	688	906	995	673	994	874	356
446	995	399	437	255	77	459	643
894	466	465	354	577	952	698	355
526	748	736	467	688	594	765	556
665	459	847	284	875	549	455	533
949	332	984	437	146	458	793	486
536	795	144	345	595	477	745	959
246	87	738	408	379	727	56	36
989	9	77	98	897	78	868	887

(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
444	94	79	9	988	44	98	9
347	93	794	449	532	836	985	97
652	944	346	944	898	589	637	954
977	427	443	895	452	555	254	446
844	959	565	844	365	478	536	778
476	494	499	499	858	687	688	924
994	439	432	949	447	535	544	559
444	487	564	477	855	754	395	485
168	496	499	246	879	937	797	898
987	787	979	998	959	687	79	959

15. Subtract:

1. 14554 — 6555 = ?	6. 15643 — 5504 = ?	11. 15043 — 5505 = ?
2. 10753 — 2755 = ?	7. 10042 — 5143 = ?	12. 12544 — 5505 = ?
3. 12502 — 3745 = ?	8. 12455 — 6235 = ?	13. 10451 — 7043 = ?
4. 13404 — 5545 = ?	9. 15543 — 7005 = ?	14. 14872 — 6235 = ?
5. 13450 — 5054 = ?	10. 14046 — 1504 = ?	15. 10001 — 9876 = ?

16. ORAL REVIEW.

1. I have 4 pictures to be hung, each needing 7 feet of wire; how much will it cost at 3 cents a yard?

2. From a piece of cloth containing 25 yards, a tailor cut 8 suits of clothes, each containing $2\frac{3}{4}$ yards; how many yards remained?

3. Henry gathered $\frac{3}{4}$ of a bushel of walnuts and $2\frac{1}{2}$ bushels of hickory nuts; how many pecks did he gather?

4. If 4 yards of muslin cost 6 dimes, how many yards can I get for $1?

5. I bought a remnant of ribbon 12 inches long, which was worth 9 cents per yard; what change should the clerk give me for a dime?

6. If a piece of ribbon $\frac{1}{4}$ of a yard long costs 5 cents, how many yards could I have bought for 50 cents?

7. Walter bought a book for 50 cents; this is $\frac{1}{3}$ of the cost of his skates, and $\frac{1}{4}$ the cost of his sled; how much will his skates and sled cost?

8. If you get 6 pounds of sugar for 50 cents, how much would 18 pounds cost you?

9. Asphalt pavement is being laid from Seventh to Twelfth Street, at the rate of one third of a block per day; how long will it take?

10. If 15 apples are sold for 5 cents, what is the price per dozen?

11. $\frac{1}{4}$ of 60 yards is how many feet?

12. How many 3-ounce packages of nutmegs can be put up from $2\frac{1}{4}$ pounds?

17.

$\frac{5}{8} + \frac{1}{4} = ?$	$\frac{1}{2} - \frac{1}{8} = ?$	$\frac{1}{2} - \frac{3}{8} = ?$	$4 \times \frac{3}{8} = ?$
$\frac{1}{2} + \frac{3}{8} = ?$	$\frac{1}{4} - \frac{3}{8} = ?$	$\frac{5}{8} - \frac{1}{8} = ?$	$3 \times \frac{1}{4} = ?$
$\frac{7}{8} - \frac{3}{8} = ?$	$\frac{1}{2} - \frac{1}{4} = ?$	$\frac{1}{2} - \frac{3}{8} = ?$	$\frac{1}{4}$ of $\frac{1}{2} = ?$
$4 \times \frac{1}{8} = ?$	$\frac{1}{4}$ of $\frac{1}{2} = ?$	$2 \times \frac{5}{8} = ?$	$5 \times \frac{3}{4} = ?$
$3 \times \frac{1}{4} = ?$	$2 \times \frac{3}{8} = ?$	$3 \times \frac{1}{8} = ?$	$6 \times \frac{3}{8} = ?$
$\frac{1}{2}$ of $\frac{1}{2} = ?$	$5 \times \frac{2}{4} = ?$	$2 \times \frac{3}{8} = ?$	$7 \times \frac{3}{4} = ?$
$\frac{1}{2}$ of $\frac{1}{4} = ?$	$3 \times \frac{3}{8} = ?$	$2 \times \frac{7}{8} = ?$	$8 \times \frac{1}{8} = ?$

18. MULTIPLYING AND DIVIDING BY 4 AND 5.

Find products of:

1. 856×4	3. 968×4	5. 2079×4	7. 1976×4
2. 978×4	4. 989×4	6. 2098×4	8. 1678×4

Find quotients of:

1. $6789 \div 4$	3. $14009 \div 4$	5. $31033 \div 4$	7. $34035 \div 4$
2. $2135 \div 4$	4. $15203 \div 4$	6. $67890 \div 4$	8. $39393 \div 4$

1. If 4 men can lay 6400 bricks in a day, how many will one man lay in the same time, working at the same rate?

2. 1260 bushels of apples are how many pecks?

3. How many square inches in 4 square feet?

19. Find products of:

1. 1856×5	3. 2765×5	5. 3579×5	7. 1948×5
2. 2708×5	4. 3769×5	6. 1978×5	8. 1067×5

Divide by 5:

1. 19290	4. 18605	7. 46979	10. 47464
2. 94806	5. 43441	8. 37300	11. 89180
3. 31433	6. 38024	9. 54306	12. 34744

1. How many 5-cents in 5895 cents?

2. What is the weight of a bushel of wheat, if 5 bushels weigh 300 pounds?

3. A man divided \$9850 equally among three sons and two daughters; how much did each receive?

4. Which is greater, $\frac{1}{5}$ of 3 times 30, or $\frac{1}{5}$ of 4 times 20? How much greater?

5. A man bought a coat for \$24, a hat for \$5, a pair of shoes for \$6, and a cravat for \$1.50; how much did they all cost? In paying the bill he gave the merchant five-dollar bills. How many bills did he use, and what change should he receive?

CHAPTER II.

1. UNITED STATES MONEY.

Read the following:

$426.37	$4003.90	$50035.05
$200.02	$9040.09	$16200.15
$187.07	$1919.19	$70017.17

Express in figures:

1. Nine hundred sixty-seven dollars eight cents.
2. Fifty-two thousand dollars twelve cents.
3. Forty-one thousand eleven dollars seven cents.
4. Eleven thousand one hundred dollars one cent.

What will 4 barrels of flour cost, at $6.80 a barrel?

$6.80 cost of one barrel.
4
$27.20 cost of 4 barrels.

Multiply as in simple numbers, and if there are cents in the multiplicand, point off two places for cents in the product.

Find products:

1. $16.15 × 3	4. $286.04 × 3	7. $0.89 × 4
2. $26.10 × 2	5. $480.70 × 4	8. $0.75 × 3
3. $45.01 × 5	6. $0.85 × 5	9. $0.90 × 5

2. What is the cost of a bushel of apples, if 5 bushels are sold for \$6?

5) \$6.00 cost of five bushels.
\$1.20 cost of one bushel.

If the dividend contains no cents, annex two ciphers, separated from dollars by a period. Divide as in simple numbers, and separate dollars from cents in the quotient.

When sugar is selling at 5 cents a pound, how many pounds can be bought for \$6?

.05) \$6.00 money to be expended.
120 number of 5-cents in 600 cents, or \$6.

120 pounds of sugar at 5 cents a pound can be bought for \$6.

Find quotients:

1. \$416.37 ÷ 5	4. \$10050.50 ÷ 3	7. \$11213.05 ÷ 2
2. \$312.22 ÷ 4	5. \$40380.90 ÷ 2	8. \$16008.00 ÷ 5
3. \$700.07 ÷ 3	6. \$25600.00 ÷ 4	9. \$90500.00 ÷ 4

3. FACTORS.

An *integer* is a whole number (so called to distinguish it from a fraction).

1. What two integers multiplied together will produce 8? 14? 16? 21? 30?

A *factor* of a number is any one of two or more integers which multiplied together produce the number.

2. Give all the pairs of factors of 32, 36, 28, 45, 48, and 50.

$$32 = \begin{cases} 4 \times 8 \\ 2 \times 16 \end{cases}$$

3. What three numbers multiplied together will produce 16? $(2 \times 2 \times 4 = 16.)$

4. What three numbers multiplied together will produce 18? 24? 27? 28? 30? 32? 40? 45?

A number which is the product of other factors besides *itself* and *one* is called a *composite number.*

NOTE. A composite number is so called because *composed* of, or produced by, factors.

5. Write the composite numbers between 20 and 40. Between 60 and 90.

4. An *even* number is one which can be divided by 2 without a remainder.

An *odd* number is one which cannot be divided by 2 without a remainder.

Write the odd numbers between 30 and 40. Which of these odd numbers are composite?

5. MULTIPLYING AND DIVIDING BY 6.

Multiply the following numbers by 6:

1. 9874	4. 5907	7. 7308	10. 10396
2. 3009	5. 8679	8. 5897	11. 12958
3. 10068	6. 11948	9. 16087	12. 11769

Divide the following by 6:

1. 32430	4. 44445	7. 56457	10. 17171
2. 34850	5. 46847	8. 58259	11. 19191
3. 37838	6. 49250	9. 57456	12. 31433

6. 1. What is received for a bushel of blackberries which is sold at the rate of 6 cents a quart?

2. A grocer paid $23.16 for honey at 6 cents a pound; how many pounds did he buy?

3. 163½ miles is one sixth of the distance from New York to Chicago; what is the distance?

4. Bought 6 cords of wood at $4.90 a cord, and gave in payment 5 barrels of flour; how much was the flour per barrel?

5. How many days in 6 years?

7. ADDITION AND SUBTRACTION.

6 + 6 AND REVIEW.

6	16	26	36	46	56	66	76	86	96
6	6	6	6	6	6	6	6	6	6

(1)	(2)	(3)	(4)	(5)	(6)
96	965	955	7659	6989	4665
594	224	436	4444	5659	7654
662	655	596	7363	8346	4469
259	386	695	6735	3653	7653
569	596	39	6646	673	4986
756	765	566	8686	968	7866
684	939	64	7895	6366	6459
566	646	995	5563	9681	2794
437	358	668	8349	7988	9778
79	788	999	6879	7687	6899

8. Subtraction of 6 from numbers ending in any one of the digits.

16	27	38	49	50	61	72	83	94	95	106
6	6	6	6	6	6	6	6	6	6	6

Make tables subtracting 6 from numbers ending in 0, 1, 2, 3, 4, and 5.

Subtract:

1. 26345 — 2556 = ?
2. 15043 — 1546 = ?
3. 19411 — 1506 = ?
4. 27522 — 3615 = ?
5. 35432 — 4546 = ?
6. 43543 — 1456 = ?
7. 59213 — 2505 = ?
8. 68334 — 1056 = ?
9. 70035 — 6056 = ?
10. 20053 — 2455 = ?
11. 49543 — 4546 = ?
12. 30533 — 36 = ?
13. 23543 — 1554 = ?
14. 50354 — 5646 = ?
15. 47352 — 4353 = ?
16. 30334 — 3455 = ?
17. 23451 — 56 = ?
18. 10052 — 1554 = ?

9. 1. I give a fifty-dollar bill in paying an account of $36.37; how much change should I get?

2. The difference between two numbers is 1160. The smaller number is 8340; what is the larger number?

3. Washington was born in 1732; in what year was he 57 years old?

4. 260 bushels of potatoes is 55 bushels more than a grocer sold during the month of September; how many bushels did he sell?

5. Bought 30 yards of cloth for $96.90, 20 yards of carpet for $40, and two pairs of curtains for $16.50; what did all cost?

6. How many strips of paper bordering, each 5 yards in length, will be required for a room which is 30 feet square? (Make a drawing.)

7. Bought a farm for $13716, and sold it for $13379; did I gain or lose?

8. A saleswoman earns $0.89 a day, and her expenses are $3.75 a week; how much does she save in 6 weeks?

9. I bought a house for $6500, spent $1876 in improvements, and then sold it for $9155; how much did I gain?

10. Of a railroad 2465 miles long, 1266 miles are double track; how many miles are single track?

10. ORAL REVIEW.

1. If 4 pounds of chocolate cost 58 cents, how many cents is that a pound?

2. If a man travel 15 miles in 3 hours, how far at this rate will he travel in 9 hours?

3. What will $\frac{3}{4}$ of a pound of candy cost, at 3 cents an ounce?

4. Bought $\frac{1}{4}$ bushel of apples and $\frac{1}{2}$ bushel of peaches; what part of a bushel have I? How many quarts did I buy?

5. $\frac{3}{8}$ of 24 + $\frac{3}{4}$ of 16 are how many times 7?

6. A man had 24 horses; after selling $\frac{3}{4}$ of them, he lost $\frac{1}{8}$ of them; how many were left?

7. Bought $4\frac{2}{3}$ pounds of grapes at 6 cents a pound; how much did they cost?

8. If 3 pounds of almonds cost 25 cents, what will 5 pounds cost at the same rate?

9. A boy gave to his sister $\frac{1}{2}$ of an orange, to his brother $\frac{1}{2}$ as much as he gave to his sister, and kept the rest himself; what part did he keep?

10. If two pounds of cheese cost 36 cents, what will half a pound cost?

11. The ages of 4 boys are 7, 9, 8, and 12; what is the average of their ages?

12. A bushel of corn weighs 56 pounds; what is the weight of a peck? a half peck? a quart?

13. A boy living $\frac{3}{4}$ mile from school, who goes home to dinner, will walk how many miles each week in going to and from school?

14. Buy 4 dozen pencils at 30 cents a dozen, and sell them at 4 cents apiece; what is gained?

15. With what you have gained buy 3 dozen erasers and sell them at 6 cents apiece; how much do you gain this time, and how much money have you altogether?

11. Solve:

$\frac{3}{6} + \frac{1}{3} = ?$	$\frac{3}{6} + \frac{1}{2} = ?$	$\frac{4}{6} - \frac{1}{3} = ?$	$4 \times \frac{1}{6} = ?$
$\frac{1}{6} + \frac{2}{3} = ?$	$\frac{6}{6} - \frac{5}{6} = ?$	$\frac{4}{6} - \frac{1}{2} = ?$	$3 \times \frac{1}{3} = ?$
$\frac{1}{2} + \frac{1}{6} = ?$	$\frac{6}{6} - \frac{1}{3} = ?$	$\frac{5}{6} - \frac{2}{3} = ?$	$6 \times \frac{1}{6} = ?$
$\frac{1}{3} + \frac{2}{6} = ?$	$\frac{6}{6} - \frac{1}{2} = ?$	$\frac{3}{6} - \frac{1}{2} = ?$	$3 \times \frac{2}{6} = ?$

$\frac{1}{3} + \frac{1}{6}$ = how many twelfths? $\frac{8}{12}$ are how many fourths?
$\frac{1}{3} + \frac{1}{4}$ = how many twelfths? $\frac{10}{12}$ are how many sixths?
$\frac{2}{12}$ = how many sixths? $\frac{1}{3}$ of $\frac{1}{4}$ is what part of a whole?
$\frac{3}{12}$ = how many fourths? $\frac{1}{2}$ of $\frac{1}{3}$ is what part of a whole?
$\frac{6}{12}$ = how many halves? $\frac{1}{3}$ of $\frac{1}{8}$ is what part of a whole?
Which is more, $\frac{9}{12}$ of a dollar or $\frac{3}{4}$ of a dollar?

12. 6 + 7 AND REVIEW.

6	16	26	36	46	56	66	76	86	96
7	7	7	7	7	7	7	7	7	7

(1)	(2)	(3)	(4)	(5)	(6)
996	967	768	997	896	6886
767	953	437	746	9565	4553
577	667	762	654	433	5665
877	336	255	979	7766	636
676	57	646	469	6568	8387
554	656	656	463	9895	656
983	364	765	539	4647	9439
767	65	276	697	676	7475
127	889	797	678	7568	8518
899	79	959	988	989	798

Add:

(7) 979, 969, 787, 696, 969, 878, 997, 788, 979, 89.
(8) 76, 967, 899, 798, 697, 876, 968, 79, 577, 87, 9.
(9) 78, 969, 697, 786, 978, 869, 979, 779, 6, 89.
(10) 707, 966, 979, 799, 689, 76, 867, 978, 706, 66.

13. 1. From the sum of 3250 and 6845 take their difference.

2. A mechanic earns $3.75 a day, and spends $2.50 a day; how much does he save in a week?

3. A man had $526 in bank; he drew out $149, deposited $358, and then drew out $76; how much remained to his credit in the bank?

4. On the first day of January a man rented a house at $480 a year, and occupied it until July 1st; how much rent should he pay?

5. Bought 760 barrels of flour, at $6 a barrel, and sold it for $5342; how much was gained?

14. 6 + 8 AND REVIEW.

Read endings:

26	46	36	96	56	76	66	86	106
8	8	8	8	8	8	8	8	8

(1)	(2)	(3)	(4)	(5)	(6)
969	688	98	666	67	58
667	363	887	664	932	9986
536	666	686	686	6666	4965
594	563	439	357	6256	7667
468	678	967	949	4949	6364
666	774	936	967	6677	5635
546	668	866	842	6773	6764
788	286	546	556	6758	7825
98	789	797	959	6998	899
8	869	789	688	7957	9

Add:

(7) 89, 966, 878, 696, 788, 966, 787, 989, 89, 95.

(8) 899, 889, 869, 688, 986, 788, 769, 969, 88, 86.

(9) 689, 869, 788, 966, 687, 869, 978, 798, 789, 989.

(10) 899, 998, 866, 689, 969, 789, 669, 898, 678, 668.

1. A man starting on a journey with $100, spends $87.57; how much has he left?

2. The sum of two numbers is 8275, and the larger is 4376; what is the smaller?

3. The difference between two numbers is 1565, and the greater number is 9564; what is the smaller?

4. A reader costs 89 cents, a geography 78 cents, an arithmetic 56 cents, a slate 17 cents, and a sponge 5 cents. If Albert works 9 days at 37 cents a day, how much money will he have left after paying for these articles out of his wages?

5. A boy worked for a farmer for 6 weeks at $4.38 a week. He spent $15.75 of his wages for a suit of clothes; how much money had he left?

15. 6 + 9 AND REVIEW.

6	16	26	36	46	56	66	76	86	96
9	9	9	9	9	9	9	9	9	9

(1)	(2)	(3)	(4)	(5)	(6)
889	67	799	896	6	6
896	936	981	9695	65	963
986	194	616	5338	636	9616
696	619	996	664	7464	7366
868	766	268	6937	39	6987
769	759	399	9996	6699	7586
996	996	663	6668	8965	9936
897	399	567	977	8898	7999
97	717	868	7196	8766	9965
6	89	978	878	988	899

1. A man bought a house and lot for $4386, and spent $\frac{1}{8}$ as much for improvements; what did the property cost him altogether?

2. A railroad train runs 3003 miles in 6 days; how far is that each day?

3. A clerk's salary is $675, of which she uses $86 in the purchase of books, and $300 for board and other expenses; how much will she have saved at the end of 6 years?

4. How many suits of clothes of 6 yards each can be made from five pieces of cloth, each containing 36 yards?

5. The expense of a party of 6 men on a visit to the National Park was $1254; what was each man's share?

16. ORAL REVIEW.

1. At 5 cents a yard, how much more will 8 yards of cloth cost than $1\frac{1}{2}$ yards of ribbon at 20 cents a yard?

2. If with $20 you can buy 5 pictures, how many, at the same rate, can you buy with $100?

3. A boy has 80 cents, and spends $\frac{5}{8}$ of it for marbles; how many blank books, at 8 cents apiece, can he buy with the rest of his money?

4. What will $\frac{5}{8}$ of a gallon of alcohol cost, at 20 cents a pint?

5. A man bought apples at the rate of 4 for 3 cents and sold them at the rate of 6 for 5 cents; what did he gain on 24 apples?

6. How many square feet of surface in a blackboard 12 feet long and 4 feet wide?

7. January, 1892, began on Friday. If 50 cents were paid into a building association every Saturday night, how much would be paid that month?

8. A teacher was offered some pictures singly at 5 cents apiece, or 13 for 50 cents; what would she save by purchasing them all at once?

9. If 14 men lay a track in 4 weeks, how long will it take one man to do the same work? How long would it take two men?

10. If 5 dozen eggs are worth \$1, how many cents are 7 dozen worth?

11. My table has a surface of 60 square feet; if it is 5 feet wide, what is its length?

12. How many cubic inches in a block of wood which is 8 inches long, 4 inches wide, and 3 inches thick?

17.

$\frac{2}{3}$ are how many wholes?	$\frac{1}{3} + \frac{1}{15} = ?$	$\frac{4}{5} - \frac{1}{3} = ?$
$\frac{1}{2}\frac{0}{0}$ are how many wholes?	$\frac{2}{3} + \frac{1}{15} = ?$	$\frac{3}{5} - \frac{1}{3} = ?$
$\frac{5}{15}$ are how many thirds?	$\frac{1}{3} + \frac{2}{15} = ?$	$1 - \frac{4}{15} = ?$
$\frac{5}{15}$ are how many fifths?	$\frac{1}{3} + \frac{4}{15} = ?$	$1 - \frac{2}{15} = ?$
$\frac{1}{3}$ of $\frac{1}{5}$ is what part of one?	$3 \times \frac{1}{5} = ?$	$3 \times \frac{2}{5} = ?$

18. Multiply by 7:

1. 6948	3. 9485	5. 6098	7. 10769
2. 5769	4. 7906	6. 6937	8. 11894

Divide by 7:

1. 19539	4. 39648	7. 54957	10. 17799
2. 18049	5. 18563	8. 13607	11. 68009
3. 17825	6. 28359	9. 27620	12. 67265

19. 1. If a boy pays \$3.75 for a hundred papers and sells them at 5 cents apiece, how much does he make?

2. A widow is to receive one fourth of an estate of \$16200, and the remainder is to be divided equally among five children; what is the share of each child?

3. A book agent bought 7 books at \$3.75 each. He sold them at \$6 each. His expenses were \$6.25. He was unable to collect for 2 books. Did he gain or lose? How much?

4. A flour merchant bought 1333 barrels of flour at \$7 a barrel. He sold 900 barrels at \$8 a barrel, and the remainder at \$6 a barrel; what was his gain?

5. Bought 7 cows at \$37 each, 6 horses at \$100 each, and 250 sheep at \$4 each. Sold all for \$2130; what was the gain?

20. 7 + 7 AND REVIEW.

Read endings:

7	27	37	47	57	67	77	87	97	107
7	7	7	7	7	7	7	7	7	7

(1)	(2)	(3)	(4)	(5)	(6)
777	795	779	996	998	766
377	548	637	576	8979	8735
747	877	765	455	6613	7269
496	743	659	979	6267	7637
673	676	575	192	5772	572
357	834	924	626	6386	9826
787	797	777	473	7676	7466
774	272	565	856	8476	887
637	956	776	69	997	7988
789	879	986	9	859	978

21. SUBTRACTION OF 7.

Read endings:

17	29	31	33	45	56	74	62	78	90	86
7	7	7	7	7	7	7	7	7	7	7

Make tables subtracting 7 from numbers ending in 1, 2, 3, 4, 5, and 6.

Subtract:

1. 24442 — 2456	7. 53320 — 1777	13. 37464 — 6476
2. 13123 — 1666	8. 44320 — 2676	14. 18875 — 3077
3. 43454 — 1456	9. 39131 — 7777	15. 99455 — 6066
4. 23455 — 1666	10. 68442 — 6767	16. 97563 — 6767
5. 35656 — 4666	11. 49563 — 6777	17. 19545 — 6077
6. 60003 — 2666	12. 18004 — 7777	18. 13006 — 1067

1. Received during the day, \$10.23; paid, \$16.83; on hand at the close of the day, \$3.55. How much was on hand at the beginning of the day?

2. A farmer traded 485 pounds of old iron at 3 cents a pound for a new stove worth \$37.50; how much cash should he pay?

3. How many years from the landing of the Pilgrims, 1620, to the Declaration of Independence, 1776?

4. A grocer paid \$12.53 for prunes, at 7 cents a pound; how many pounds did he buy?

5. How much must I add to \$7650 to be able to pay for a farm worth \$12400?

22. FACTORS. PRIME NUMBERS.

What is a composite number? What is a factor of a number? What is an integer?

1. Name the numbers which are not composite:

1	6	11	16	21	26	31	36
2	7	12	17	22	27	32	37
3	8	13	18	23	28	33	38
4	9	14	19	24	29	34	39
5	10	15	20	25	30	35	40

A number which has no exact divisor, except *itself* and *one*, is called a *Prime Number*.

2. Write in columns the numbers from 40 to 90, and mark those that are prime numbers.

A prime number may be a factor of some other number.

3. What prime numbers are factors of 6; 14; 21?

A prime number used as a factor is called a *Prime Factor.*

4. What are the prime factors of 27; 35; 63; 72?

5. Find all the prime factors of 108.

$9 \times 12 = 108$. $9 = 3 \times 3$, and $12 = 2 \times 2 \times 3$.
$108 = 3 \times 3 \times 2 \times 2 \times 3$.

23. Find the prime factors of 280.

$$\begin{array}{r|l} 7 & 280 \\ \hline 5 & 40 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline & 2 \end{array}$$

$7 \times 5 \times 2 \times 2 \times 2 = 280$
Prime factors.

Divide the number by any prime factor: if the quotient is not a prime factor, divide it in the same way. Continue to divide until the quotient is a prime number. The divisors and the last quotient are the prime factors.

Find prime factors:

1. 210	4. 312	7. 546	10. 615	13. 873
2. 287	5. 390	8. 594	11. 714	14. 910
3. 246	6. 486	9. 684	12. 819	15. 987

24. 7 + 8 AND REVIEW.

Read endings:

7	27	37	47	57	67	77	87	97	107
8	8	8	8	8	8	8	8	8	8

(1)	(2)	(3)	(4)	(5)	(6)
888	888	778	669	789	6789
777	382	223	179	6846	6677
443	627	879	768	7973	9826
978	365	458	795	4769	3667
726	967	764	987	6268	9547
789	194	228	876	8666	6978
621	797	977	754	9568	8779
775	777	842	478	7599	978
647	949	498	729	975	74
689	589	798	978	89	9

25. Subtract:

1. 44320 — 1667
2. 36543 — 4757
3. 17654 — 5667
4. 28065 — 6776
5. 69676 — 5767
6. 49075 — 7076
7. 29640 — 6777
8. 90653 — 3767
9. 80076 — 2076
10. 70604 — 5075
11. 60243 — 4767
12. 59456 — 7537

1. A lady had $30. She bought a dress for $8.10, shoes for $1.85, 7 yards of cashmere at 75 cents a yard, and a shawl for $4; how much had she left?

2. A merchant buys boots at $5.20 a pair, and sells them at $6 a pair; what does he make in selling 7 pairs?

3. My grocery bill on the several days of the week was $3.76, $2, $3.58, $2.07, $1.89, and $1.45. On this I paid at one time during the week $5, and at another $4.50; how much do I still owe?

4. How much more will 7 yards of cloth cost, at $4.50 per yard, than 5 yards at $3.75 per yard?

26. 7 + 9 AND REVIEW.

Read endings:

7	17	27	37	47	57	67	77	87	97	107
9	9	9	9	9	9	9	9	9	9	9

(1)	(2)	(3)	(4)	(5)	(6)	(7)
999	977	988	789	794	9779	97
776	296	979	189	9685	9979	686
245	872	777	756	8546	6877	399
777	187	448	257	8767	6777	769
833	956	776	764	6794	864	267
999	797	129	657	9467	6468	988
632	427	794	775	1895	9736	233
769	984	669	867	8736	798	777
647	227	778	978	6759	9797	97
789	898	976	598	988	986	89

27. Subtract:

1. 38345 — 14677
2. 39745 — 16756
3. 10000 — 6117
4. 20412 — 7777
5. 10586 — 5767
6. 70001 — 4006
7. 17653 — 2767
8. 69114 — 7116
9. 80000 — 67

28. ORAL REVIEW.

1. $\frac{3}{7}$ of 21 + $\frac{3}{8}$ of 40 are how many times 6?

2. Bought 6 bars of soap for a quarter of a dollar; how much is that a bar? What will 9 bars cost at the same rate?

3. James had 72 cents. He spent $\frac{1}{2}$ of it for a new book, and $\frac{1}{3}$ for pencils; what part did he spend? What part has he left? How many cents?

4. A colt was bought for $60, and sold for $1\frac{1}{3}$ times its cost; what was the gain?

5. What will $\frac{6}{7}$ of 35 pears cost at 5 cents each?

6. What will $\frac{3}{4}$ of a gallon of vinegar cost at 9 cents a quart?

7. A market woman bought 4 quarts of berries for 39 cents, and sold them at 6 cents a pint; how much did she gain?

8. How many minutes in $\frac{6}{12}$ of an hour? What other part of an hour can we call this?

9. At the rate of 7 marbles for 9 cents, what will $3\frac{1}{2}$ dozen cost? $3\frac{1}{2}$ dozen is how many times 7?

10. I have 66 cents. If I spend $\frac{2}{11}$ of them for eggs, how many will I get at 24 cents a dozen? If I then spend $\frac{4}{11}$ of the whole number for a pound of butter, what part of my money have I left? If I then spend $\frac{1}{2}$ of the remainder for nuts, how much money have I left?

11. If 12 cents is $\frac{1}{7}$ of the cost of a book, what will 2 books cost?

12. At 7 cents an ounce, what will $3\frac{1}{2}$ pounds of nutmegs cost?

13. A grocer buys 8 barrels of apples, 7 times that number of barrels of potatoes, and $\frac{1}{4}$ as many barrels of turnips as potatoes. How many barrels of turnips does he buy?

14. Frank had $2.80. He spent $\frac{1}{4}$ of it for a cap, $\frac{1}{7}$ of it for a ball, and with the remainder bought a book; how much did the book cost?

15. If 7 yards of cloth cost $53, for how much must it be sold a yard to gain $10?

16. A man bought 56 pounds of sugar and sold $\frac{1}{7}$ of it; how many pounds has he left?

17. I had 70 cents. Of this I spent $\frac{1}{7}$ for some cheese, and $\frac{3}{7}$ for steak; how many sevenths had I left? How much money?

18. If 7 yards of ribbon cost $4.20, what should 2 yards cost?

19. A dealer had 77 baskets of cranberries. 11 baskets were spoiled; what part of his cranberries were good?

29.

$\frac{4}{10}$ are how many fourths? $\frac{3}{8} + \frac{1}{4} = ?$ $\frac{1}{4} - \frac{1}{8} = ?$
$\frac{1}{10}$ are how many fourths? $\frac{3}{4} + \frac{1}{8} = ?$ $\frac{3}{8} - \frac{1}{4} = ?$
$\frac{1}{10}$ are how many fifths? $\frac{3}{5} + \frac{1}{2} = ?$ $8 \times \frac{3}{8} = ?$
$\frac{1}{10}$ are how many tenths? $\frac{3}{8} - \frac{1}{4} = ?$ $7 \times \frac{3}{8} = ?$

30. Multiply by 8:

1. 3849	3. 6957	5. 6384	7. 6094	9. 8649
2. 8539	4. 9384	6. 3947	8. 7483	10. 5973

Divide by 8:

1. 41443	3. 56457	5. 21391	7. 29019	9. 62808
2. 51652	4. 58259	6. 39036	8. 78863	10. 39013

31. 1. At $2.40 a gallon, what is the price of a pint of varnish?

2. How many two-gallon pails will be required to hold 64 quarts of water?

3. One man can build a wall in 120 days; how long will it take 8 men to do it?

4. At $8 a head, how many sheep can be bought for $552?

5. At $1.60 a bushel, what is 1 quart of strawberries worth?

6. A coal dealer paid $1752 for coal at $8 a ton; how many tons did he buy?

7. How many barrels of flour at $8 a barrel will pay for 52 cords of wood at $6 a cord?

32. 8 + 8 AND REVIEW.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
787	698	988	878	878	97	77
439	797	675	636	889	7719	9998
978	685	799	987	386	8778	8794
828	878	479	957	879	8653	7347
584	154	988	969	787	4877	5865
748	488	843	768	687	7777	7179
886	728	788	856	995	4859	2759
686	871	788	949	297	8796	9578
738	348	919	786	798	89	628
988	899	899	877	768	7	88

33. Subtraction of 8:

Read endings:

11	23	38	44	50	62	75	87	99	96	101
8	8	8	8	8	8	8	8	8	8	8

Make tables, subtracting 8 from numbers ending in 1, 2, 3, 4, 5, 6, and 7.

Subtract:

1. 24321 — 2878	5. 29530 — 4878	9. 20595 — 5468
2. 16653 — 388	6. 14878 — 7807	10. 60677 — 6878
3. 37304 — 5888	7. 88676 — 17878	11. 69004 — 10768
4. 48765 — 4878	8. 19644 — 888	12. 78002 — 7834

34. 1. A lady bought 2 yards of ribbon at 37 cents a yard, 6 yards of muslin at 19 cents a yard, 3 yards of flannel at 35 cents a yard, 5 yards of lace at 98 cents a yard, some needles for 31 cents, and a belt for 75 cents; what did her purchases amount to?

2. Bought a pair of boots for $8.50, an umbrella for $3.62, a pair of gloves for $1.25, some collars for $0.75, and a hat for $4; what did all cost?

3. Bought 8 yards of velvet at $1.25, 4 yards of satin at $1.85, 6 yards of Spanish lace at $0.87, and 7 yards of sateen at $0.38. Make out the bill.

4. Mr. John R. Holt bought of Hains & Co., 6 dozen oranges at 28 cents a dozen, 4 pounds of tea at 75 cents a pound, 8 lamp chimneys at 10 cents each, 10 pounds of crackers at 9 cents a pound, 5 pounds of coffee at 35 cents a pound, and 8 pounds of starch at 20 cents a pound. Make out the bill.

5. One third the value of my farm is $\frac{1}{2}$ the value of my house and lot. If the farm is worth $3600, what is the value of the house and lot?

35. 8 + 9 AND REVIEW.

Read endings:

8	18	28	38	48	58	68	78	88	98
9	9	9	9	9	9	9	9	9	9

1. Add 899, 283, 998, 158, 895, 887, 728, 993, 947, 989.

2. Find the sum of 78, 8887, 9988, 9763, 8989, 8799, 95, 9887, 48, 988.

3. Add 767, 6512, 9899, 8269, 768, 6938, 9799, 8967, 937, 8788.

4. Find the amount of 89, 6478, 9878, 7468, 9826, 9676, 9832, 7989, 899, 7.

5. 679 + 695 + 977 + 889 + 649 + 877 + 778 + 898 + 879 + 879 = ?

36.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
899	8	9	78	767	89	679
283	839	979	8887	6512	6478	695
998	888	83	9988	9899	9878	977
158	889	848	9763	8269	7468	889
895	393	889	8989	768	9826	649
887	868	738	8799	6938	9676	877
728	474	996	95	9799	9832	778
993	987	897	9887	8967	7989	898
947	859	58	48	937	899	879
989	79	69	988	8788	7	879

37. Multiply by 9:

1. 8439	6. 5968	11. 6874	16. 9005	21. 6298
2. 7095	7. 6374	12. 3758	17. 8161	22. 2759
3. 6394	8. 4738	13. 8647	18. 7463	23. 8463
4. 8007	9. 6834	14. 9376	19. 6389	24. 3874
5. 6398	10. 4958	15. 4837	20. 8476	25. 6438

Divide by 9:

1. 15443	7. 13540	13. 39128	19. 53080	25. 29123
2. 17867	8. 44547	14. 29109	20. 44064	26. 20367
3. 27364	9. 88432	15. 24389	21. 41229	27. 23389
4. 72351	10. 76302	16. 66093	22. 45562	28. 35198
5. 11128	11. 68134	17. 75623	23. 89054	29. 55555
6. 55408	12. 47562	18. 64224	24. 76323	30. 44444

38. 1. How many square yards in 90 square feet?

2. What is the cost of 18 square yards of canvas, at 8 cents a square foot?

3. Name the numbers divided by 9 which give the following results: 8, 11, 7, 12, 6, 9.

4. What will $2\frac{1}{2}$ bushels of strawberries cost, at 9 cents a quart?

5. A clerk saved \$114.66 in 9 months; his salary was \$75 a month; what were his expenses each month?

6. If I buy 9 horses at \$120 each, and sell all of them for \$2000, how much do I gain?

39. 9 + 9.

Read endings:

9	19	29	39	49	59	69	79	89	99
9	9	9	9	9	9	9	9	9	9

Add:

(1) 9998, 6799, 8798, 9789, 8989, 9987, 8899, 7899, 7027, 698.

(2) 7978, 5887, 7646, 9687, 9596, 6988, 8799, 7996, 7968, 967.

40. SUBTRACTION OF 9.

Read endings:

11	43	28	32	54	65	79	87	96	109
9	9	9	9	9	9	9	9	9	9

Subtract:

1. 88764 — 2969	6. 40031 — 9594	11. 10962 — 2999
2. 49875 — 2789	7. 58431 — 3989	12. 68753 — 9095
3. 37953 — 1896	8. 19052 — 9298	13. 90087 — 5069
4. 90585 — 13898	9. 90745 — 11989	14. 19864 — 10989
5. 60103 — 389	10. 70001 — 9867	15. 90003 — 7648

41. MISCELLANEOUS PROBLEMS.

1. 9 rugs, which cost $7.80 each, were sold for $85.41; what was the profit on each rug? On 9 rugs?

2. A merchant bought 9 pieces of merino, each piece containing 45 yards. After selling 135 yards, how many dress patterns of 9 yards each had he left?

3. A laborer saves $9 a month; how many months will it take him to save $684? How many years?

4. Bought 882 acres of woodland. After clearing one ninth of it, I sold the cleared land at $8 an acre and the woodland at $9 an acre; how much did I receive in all?

5. If you have $238 when you are 18 years old, and save $49 each year until you are 27, how much money will you then have?

6. A lady having $125, bought a cloak for $75, and 7 yards of silk at $1.85 a yard; how much money had she left?

7. A coal dealer bought 11 tons of coal for $144.97 and sold it at $8.50 a ton; did he gain or lose? How much?

8. One piece of muslin is 9 cents a yard, and another is 6 cents a yard; if I have $1.80, how many more yards of the second kind can I buy than of the first?

9. A hotel-keeper bought 98 pounds of crackers at 8 cents a pound, and 138 loaves of bread at 6 cents a loaf; how much did he pay for both?

10. At 5 cents a quart, what is the value of a barrel of cider containing $31\frac{1}{2}$ gallons?

11. Sold 567 barrels of flour for $9 a barrel; the wheat cost $2795, the expense of milling was $670; how much was gained?

CHAPTER III.

1. NOTATION AND NUMERATION.

TWO PERIODS: UNITS AND THOUSANDS.

2d period. Thousands.			1st period. Units.		
hundreds.	tens.	units.	hundreds.	tens.	units.
0	0	0	0	0	0

Ten ten-thousands are equal to *one* hundred-thousand.

One hundred-thousand is how many times ten thousand?

Hundred-thousands are written in the first place to the left of ten-thousands.

352,400 is read, three hundred fifty-two thousand four hundred. The figure 3 expresses the number of hundred-thousands.

Expressing numbers by means of figures is called *Notation*. Expressing in words a number written in figures is called *Numeration*.

Ten units of any order make *one* of the next higher order.

In the number 405,623, in what place or order does the figure 6 stand? The figure 4? 2? 0?

2. Write 6 ciphers and separate them into periods. Place 3 in hundred-thousands' place, 2 in thousands' place, and 4 in hundreds' place. Read the number you have written.

Read the following numbers:

401,392	500,020	800,005	110,111
503,001	909,008	850,050	101,001
648,406	763,204	616,016	111,101

Express the following in figures:

Two hundred thousand sixty-three.
Seven hundred seven thousand eighty-one.
Five hundred fifty-one thousand one.
Eight hundred eighteen thousand six.
One hundred eleven thousand eleven.
Two hundred thousand twelve.
Nine hundred nineteen thousand nineteen.

3. THREE PERIODS: UNITS, THOUSANDS, AND MILLIONS.

3d period. Millions.			2d period. Thousands.			1st period. Units.		
hundreds.	tens.	units.	hundreds.	tens.	units.	hundreds.	tens.	units.
0	0	0	0	0	0	0	0	0

The third period of figures expresses *ones* of millions, *tens* of millions, and *hundreds* of millions.

Write 9 ciphers and separate them into periods Place 3 in ten-thousands' place, 6 in ten-millions'

place, 8 in tens' place, 4 in thousands' place, and 7 in millions' place. Read the number.

4. Read the following numbers:

100,000,000	150,004,150	19,300,019
1,000,000	50,040,040	9,999,000
4,700,630	804,307,321	11,110,011
20,343,101	10,010,001	10,111,101

Write in figures:

Fifty-six million one hundred seventeen thousand six hundred nine.

Three hundred eight thousand three hundred eight; six million sixteen.

Ten million one hundred eleven thousand one.

5. MULTIPLYING AND DIVIDING BY 10.

Find products:

7865×10 8079×10 80563×10 96532×10

Short Method. When the multiplier is 10, the product is obtained by annexing zero to the multiplicand.

89736×10 78895×10 45838×10 40009×10

Find quotients:

$28930 \div 10$ $26845 \div 10$ $870470 \div 10$ $693879 \div 10$

Short Method. Cut off one figure from the right of the dividend. The remainder will be the figure cut off from the dividend.

$7630456 \div 10$ $3987652 \div 10$ $3101487 \div 10$

6. MULTIPLYING AND DIVIDING BY 11.

TABLES.

$10 \times 11 = 110$ $11 \times 11 = 121$ $12 \times 11 = 132$

Copy the following, and complete to $12 \times 11 = 132$ and $132 \div 11 = 12$.

$0 \times 11 = 0$	$2 \times 11 = 22$	$4 \times 11 = 44$
$1 \times 11 = 11$	$3 \times 11 = 33$	$5 \times 11 = 55$

$11 \div 11 = 1$	$16 \div 11 = 1$, 5 rem.	$21 \div 11 = 1$, 10 rem.
$12 \div 11 = 1$, 1 rem.	$17 \div 11 = 1$, 6 rem.	$22 \div 11 = 2$
$13 \div 11 = 1$, 2 rem.	$18 \div 11 = 1$, 7 rem.	$23 \div 11 = 2$, 1 rem.
$14 \div 11 = 1$, 3 rem.	$19 \div 11 = 1$, 8 rem.	$24 \div 11 = 2$, 2 rem.
$15 \div 11 = 1$, 4 rem.	$20 \div 11 = 1$, 9 rem.	$25 \div 11 = 2$, 3 rem.

Multiply by 11:

1. 89723	3. 830976	5. 385047	7. 748693
2. 65049	4. 394857	6. 629875	8. 480019

Divide by 11:

1. 25826	4. 899604	7. 567802	10. 9800457
2. 20441	5. 283563	8. 900456	11. 2394836
3. 37838	6. 190009	9. 404040	12. 1938479

7. ORAL REVIEW.

1. A man bought a horse for \$64. He paid $\frac{5}{8}$ of the cost; how much does he still owe?

2. A farmer having 96 bushels of apples sold $\frac{1}{8}$ of them, used $\frac{2}{8}$, and stored the remainder; how many bushels were stored?

3. In how many days can 6 men do as much work as 8 men can do in 9 days?

4. If 8 barrels of flour cost \$58, and were sold at \$8 a barrel, what was the gain?

5. If a boy earns \$8 a month, and spends $\frac{1}{8}$ of his wages for clothes, how much will he save in a year?

6. A man gave 80 cents for his lodging, which was $\frac{4}{7}$ as much as his meals cost; how much did his meals cost?

7. $9 \times 7 + 9$ divided by 12 is what part of 36?

8. A man had 96 books and sold 84 of them; what part of his books had he left?

9. If 9 yards of muslin cost 108 cents, what will 7 yards cost?

10. A man paid 75 cents for his lodging, which was $\frac{3}{5}$ of the cost of his meals; what were his expenses for the day?

11. If 12 yards of cloth cost \$86, for how much per yard must it be sold to gain \$10? \$16?

12. At 9 cents a yard, how much more will 9 yards of ribbon cost, than $2\frac{1}{3}$ yards at 21 cents a yard?

13. A boy started to the show with \$5.00. He paid $\frac{1}{2}$ of it for a railroad ticket, $\frac{1}{5}$ of the remainder for his dinner, $\frac{1}{8}$ of what was left for bananas, $\frac{1}{7}$ of what then remained for a ticket to the show. How much had he left?

14. If a cook uses 9 eggs each day, in how many days will she use 9 dozen?

15. A horse is worth $144, but a man wishing to buy it has only $96. How many more dollars must he have to buy the horse?

16. A man has $81. He paid $\frac{4}{9}$ of it for a pony and $\frac{2}{9}$ for a cart; what part of his money did he spend? What part did he have left? How much money did he spend?

17. How many squashes at 7 cents each will pay for $9\frac{1}{3}$ pounds of prunes at 9 cents a pound?

8. $\frac{1}{3}$ of $\frac{1}{3}$ is what part of a whole?

$\frac{1}{4}$ of $\frac{1}{3}$ is what part of a whole?

$\frac{1}{3} + \frac{1}{3} = ?$ $\frac{1}{3} + \frac{1}{3} = ?$ $\frac{1}{3} + \frac{1}{3} = ?$

$\frac{1}{3}$ of $\frac{1}{3}$ of a yard is how many inches?

$\frac{1}{4}$ of $\frac{1}{3}$ of a yard is how many inches?

1. If $9185 be equally divided among 11 men, how many dollars will each receive?

2. A merchant bought 11 pieces of alpaca of 39 yards each. After selling 119 yards how many dress patterns of 10 yards each has he left?

3. The product of two numbers is 40128; one of the numbers is 11, what is the other?

4. How many days in 11 years?

5. A shoe merchant made $240.90 on 11 dozen pairs of shoes; what was the profit on one dozen pairs?

9. MULTIPLYING AND DIVIDING BY 12.

TABLES.

$9 \times 12 = 108$ $10 \times 12 = 120$ $11 \times 12 = 132$ $12 \times 12 = 144$

Copy the following tables, and complete to 12×12 and $144 \div 12$.

$0 \times 12 = 0$	$2 \times 12 = 24$	$4 \times 12 = 48$
$1 \times 12 = 12$	$3 \times 12 = 36$	$5 \times 12 = 60$

$12 \div 12 = 1$	$18 \div 12 = 1$, 6 rem.	$24 \div 12 = 2$
$13 \div 12 = 1$, 1 rem.	$19 \div 12 = 1$, 7 rem.	$25 \div 12 = 2$, 1 rem.
$14 \div 12 = 1$, 2 rem.	$20 \div 12 = 1$, 8 rem.	$26 \div 12 = 2$, 2 rem.
$15 \div 12 = 1$, 3 rem.	$21 \div 12 = 1$, 9 rem.	$27 \div 12 = 2$, 3 rem.
$16 \div 12 = 1$, 4 rem.	$22 \div 12 = 1$, 10 rem.	$28 \div 12 = 2$, 4 rem.
$17 \div 12 = 1$, 5 rem.	$23 \div 12 = 1$, 11 rem.	$29 \div 12 = 2$, 5 rem.

Find products:

1. 7809×12	5. 29848×12	9. 637498×12	13. 618094×12
2. 9489×12	6. 729521×12	10. 349526×12	14. 190728×12
3. 7618×12	7. 47836×12	11. 67849×12	15. 728397×12
4. 9284×12	8. 39647×12	12. 569003×12	16. 855356×12

Divide by 12:

1. 6384	7. 49673	13. 78645321	19. 986000487
2. 2952	8. 83440	14. 11111111	20. 758192436
3. 29548	9. 970836	15. 99999999	21. 967689363
4. 98345	10. 483974	16. 35689031	22. 689285349
5. 54389	11. 298375	17. 24949678	23. 478690007
6. 87432	12. 483762	18. 86078593	24. 692746583

10. MISCELLANEOUS PROBLEMS.

1. A manufacturer received $2688 for gloves, at the rate of $12 per dozen pairs; how many dozen pairs did he sell?

2. A man left a fortune of $3917502 to his wife, 5 children, and 3 brothers; what is the share of each, if the money be equally divided?

3. How many tons of coal, at $9 per ton, can be bought for $3785904?

4. How many barrels of flour, at $9 per barrel, will pay for 60 cords of wood, at $12 per cord?

5. 12 men can do a piece of work in 20 weeks, counting 6 working days to the week; in how many days can one man do the same work?

6. How many revolutions will be made by a wheel 12 feet in circumference in running 52800 feet?

11. MISCELLANEOUS TABLES.

NUMBERS.	PAPER.
12 things are 1 dozen.	24 sheets are 1 quire.
12 dozen are 1 gross.	20 quires are 1 ream.
20 things are 1 score.	2 reams are 1 bundle.

A bushel of wheat, potatoes, or beans	= 60 lb.
A bushel of corn or rye	= 56 lb.
A bushel of corn-meal, rye-meal, or cracked corn	= 50 lb
A bushel of barley	= 48 lb.
A bushel of timothy	= 45 lb.
A bushel of oats	= 32 lb.
A barrel of flour	= 196 lb.
A barrel of beef or pork	= 200 lb.

12. BILLS.

1. Bought 25 lb. of sugar, @ 7¢ . . . $
   " 11 " tea, " 48¢ . . .
   " 12 " coffee, " 53¢ . . .
   " 22 " raisins, " 11¢ . . .
   " 19 " currants, " 9¢ . . .
   " 18 " crackers, " 12¢ . . . _____

What is the amount of my bill?

2. Bought 12 lb. of dried apples, @ 9¢ . . $
   " 14 doz. " eggs, " 15¢ . .
   " 32 qt. " milk, " 6¢ . .
   " 9 bu. " potatoes, " 65¢ . .
   " 12 lb. " butter, " 22¢ . .
   " 11 lb. " cheese, " 18¢ . . _____

What is the amount of my bill?

3. Bought 9 bbls. of apples @ $2.15 . . $
   " 12 bu. " plums " 1.20 . .
   " 9 " " peaches " 1.75 . .
   " 20 " " cherries " 1.05 . .
   " 12 " " pears " 1.35 . .
   " 11 " " quinces " 1.50 . . _____

What was the whole amount?

4. CINCINNATI, O., Aug. 27, 1890.

Mr. JOHN NORRIS,

Bought of CHARLES E. SCOTT & Co.,

3 student lamps	@ $3.75 . . . . $	
1 doz. knives and forks	" 4.25	
1 doz. plated teaspoons	" 2.65	
1 refrigerator		12.75
1 lawn mower		6.10
2 rakes, $0.68 and $0.93		
1 step ladder		4.75

Received payment,

CHARLES E. SCOTT & CO

per JOHN M. AUSTIN.

5. CINCINNATI, O., Aug. 27, 1892.

MR. JAMES K. MARTIN,

Bought of LLOYD, WATSON & Co.,

9 yards of cassimere,	@ $2.85 . . .	$	
12 yards of pressed flannel,	" .58 . . .		
11 yards of black silk,	" 1.65 . . .		
2 pairs of hose,	" .75, $1.25 .		
1 cloak			18.00
1 pair of blankets			6.75
6 handkerchiefs,	" .40 . . .		
9 linen towels,	" .35 . . .		

Received payment,

LLOYD, WATSON & CO
W.

13. Add:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
28	88	38	56	29	28292	13977	44189
92	32	89	69	99	94919	88945	99899
19	99	93	95	92	98189	98288	65288
81	88	38	56	29	28922	33947	76879
28	33	89	69	99	94889	89885	88968
92	89	93	95	92	98328	99689	47399
19	98	38	56	29	28994	33641	89863
81	33	89	69	99	94418	98888	66258
28	89	93	95	92	98999	88697	98898
92	91	38	56	29	28884	33635	75364
19	38	89	69	99	94937	89889	84959
81	99	93	95	92	98488	99398	66895
28	83	38	56	29	28992	33533	78386
92	39	88	69	99	94838	88489	95939
19	83	95	94	95	89985	98982	58897
88	95	74	74	73	76794	87696	89661

Subtract:

1. 1000101 — 345879
2. 80118181 — 698197
3. 864121133 — 36849762
4. 90148003 — 9876435
5. 67100011 — 400968
6. 810890890 — 20987689

14. TO MULTIPLY WHEN THE MULTIPLIER CONSISTS OF MORE THAN ONE ORDER.

Multiply 968 by 18:

968
18

8 times 968 = 7744 1st partial product.
10 times 968 = 9680 2d partial product.
18 times 968 = 17424 total product.

The product of 968 units by 8 units gives 7744 units.

The product of 968 units by 1 ten gives 968 tens (9680 units).

7744 units + 968 tens = 17424 units.

NOTE. It is not necessary to write the zero as the right-hand figure of the second partial product. The product of 8 units by 1 ten is 80, and the 8 tens must be written in tens' place, in the partial product.

15. Find products:

1. 70697×26	7. 78009×95	13. 10086×97	19. 30085×68
2. 68309×58	8. 87926×87	14. 28594×85	20. 46927×74
3. 13597×94	9. 90193×68	15. 39457×69	21. 37619×40
4. 24318×68	10. 29658×76	16. 53749×58	22. 46538×87
5. 37906×47	11. 19037×98	17. 94008×37	23. 90108×90
6. 56708×89	12. 78395×79	18. 58096×59	24. 18693×88

16. LONG DIVISION.

Divide 2688 by 12:

Short Method.

12) 2688
224 quotient.

Long Method.

12) 2688 (224 quotient.
24
28
24
48
48

2600 contains 12 two hundred times, with 2 hundreds remaining undivided.

28 tens contains 12 two tens times, with 4 tens remaining undivided.

48 units contains 12 four times.

	Partial dividends.	Partial quotients.
	2400	200
12	240	20
	48	4
	2688	224 quotient.

The process of Long Division is the same as that of Short Division, except that the work is written in full, and the quotient is written to the right of the dividend.

Find quotients:

Find the quotient figure by using the left-hand figure of the divisor as a trial divisor.

1. $3840 \div 12$	7. $3453 \div 15$	13. $3800 \div 18$	19. $6120 \div 18$
2. $1456 \div 13$	8. $6720 \div 12$	14. $4370 \div 19$	20. $7989 \div 19$
3. $2899 \div 13$	9. $6820 \div 12$	15. $5304 \div 17$	21. $8600 \div 19$
4. $4686 \div 22$	10. $4480 \div 14$	16. $5990 \div 17$	22. $31688 \div 24$
5. $2825 \div 25$	11. $3682 \div 16$	17. $4000 \div 16$	23. $79572 \div 36$
6. $4899 \div 23$	12. $3800 \div 17$	18. $4600 \div 19$	24. $95040 \div 45$

17. MISCELLANEOUS PROBLEMS.

1. How much can I save in a year if I earn \$140 each month for ten months, and spend \$68.63 each month for 12 months?

2. What will 2 bushels of berries cost at 12½ cents a quart?

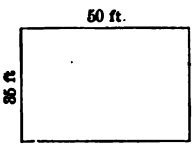
3. A man bought 28 boxes of lemons at $5.25 per box, and sold them at $4.68 per box; how much did he lose?

4. How many cubic inches in a block of wood 12 inches long, 12 inches wide, and 12 inches high?

5. If I save 5 cents a day, how much shall I save in 19 years?

6. A commission house spends $30 a day for telegrams; how much is spent in 65 days?

7. If 12 men earn $72 in one week, how much will 18 men earn in the same time?



8. How many square feet of surface has the floor of this room?

How many square yards of oil-cloth will be required to cover the floor?

18. Find quotients:

48) 24396 (508
240
396
384
12 remainder.

The divisor is not contained in the second partial dividend (39 tens); write 0 in tens' place, and annex 6 units to form a partial dividend.

32019 ÷ 53	22592 ÷ 32	14687 ÷ 48	14689 ÷ 36
11043 ÷ 27	40417 ÷ 57	19469 ÷ 64	25424 ÷ 28
37482 ÷ 93	38577 ÷ 77	63150 ÷ 89	27124 ÷ 54

19. 1. A man, having \$18432, deposited \$558, and with the remainder bought land at \$54 an acre; how many acres did he buy?

2. A buys 83 horses for \$12035, and B buys 97 acres of land for \$18915; what is the difference in value between one of A's horses and one of B's acres of land?

3. What will it cost to pave a street 1 mile (5280 feet) long and 60 feet wide, at 37 cents a square foot?

4. Find the cost of a piece of oilcloth 24 feet long and 15 feet 9 inches wide, at 85 cents a square yard.

5. A train leaves a certain station at 4 A. M., running at the rate of 28 miles an hour; a second train leaves the same station two hours later, running in the same direction at the rate of 36 miles an hour. When will the fast train overtake the slow, and how far from the starting place?

HINT. Gain in 1 hour, 8 miles. 56 miles to be gained. 56 miles ÷ 8 miles = 7. How far has the fast train travelled in 7 hours?

6. If the remainder is 17, the quotient 75, and the dividend 45767, what is the divisor?

20. ORAL REVIEW.

1. If 40 men can do a piece of work in 10 days, in what time could 8 men do the same work?

2. In my farm are 120 acres; $\frac{4}{10}$ of it is in meadow, $\frac{3}{10}$ in wheat, and the rest in woodland. What part is woodland? How many acres?

3. A stationer bought 12 dozen pens at 5 cents a dozen, and sold them two for a cent; what did he gain?

4. I had $120. I spent $\frac{1}{3}$ of it for a watch, $\frac{1}{4}$ of it for an overcoat, and $\frac{3}{10}$ of it for board; how much had I left?

5. A man had a dozen boxes of candy, each box containing 10 pounds. If he makes of it packages containing one half-pound each, how many packages will he have?

6. A man carried $4\frac{3}{4}$ pecks of cherries to market, and sold them at ten cents a quart; how much did he receive for them?

7. At 2 cents a square foot, what will $12\frac{1}{2}$ square yards of wire cloth cost?

8. Find the cost of 10 yards of calico at 14 cents a yard, and 8 yards of ribbon at 20 cents a yard?

9. A lady paid $\frac{1}{2}$ of a dollar for a thimble, $\frac{2}{5}$ of a dollar for braid, and $\frac{3}{20}$ of a dollar for thread. How many hundredths of a dollar did each cost? How much money did she spend?

10. James had $100, and spent $\frac{1}{2}$ of it for a watch and $\frac{2}{10}$ for a coat. How much money did he have left?

11. Give the squares of all the numbers from 1 to 10.

21. Find products:

$8094 \times 208 = ?$ $8094 \times 100 = ?$

	8094	8094
	208	100
8 times 8094 =	64752	8094 (hundreds) = 809400 units.
200 " 8094 =	1618800	
208 " 8094 =	1683552	

NOTE. When the multiplier is 10, 100, 1000, etc., the product is obtained by annexing as many zeros to the multiplicand as there are zeros in the multiplier. $8094 \times 100 = 809400$.

1. 2965×284	7. 3098×769	13. 3548×368
2. 3472×409	8. 4837×694	14. 6497×309
3. 5409×538	9. 6789×358	15. 3859×276
4. 5696×607	10. 2864×708	16. 9294×509
5. 2897×986	11. 2022×100	17. 6789×698
6. 3587×659	12. 4967×967	18. 3008×987

22. PROBLEMS.

1. A stationer buys 4 gross lead pencils at \$3.75 a gross, and retails them at 8 cents each; how much does he gain?

2. The Civil War began in 1861; how long ago was that?

3. What will be the cost of slating a roof, 38 feet long and 27 feet wide, at \$3.50 a square yard?

4. A fruit dealer bought 6 bushels of peaches at \$3.50 a bushel, and sold them at 15 cents a quart; did he gain or lose, and how much?

5. What is the cost of a cable 972 feet long, at 95 cents a yard?

6. A farmer has 8 ten-acre lots, in each of which he pastures 8 cows; each cow produces 114 pounds of butter, for which he receives $16\frac{1}{2}$ cents a pound; the expenses for each cow are $5.50. How much does he make by his dairy?

7. Bought 6 reams of foolscap paper at $2.75 a ream; sold $\frac{1}{3}$ of it at 25 cents a quire, and the remainder at the rate of 4 sheets for 6 cents. How much did I make?

23. Find quotients:

1.	$133215 \div 107$	7.	$444280 \div 232$	13.	$766080 \div 315$
2.	$347655 \div 215$	8.	$519013 \div 319$	14.	$660303 \div 423$
3.	$809437 \div 621$	9.	$923257 \div 862$	15.	$735289 \div 599$
4.	$217892 \div 493$	10.	$707861 \div 639$	16.	$603972 \div 224$
5.	$1130493 \div 533$	11.	$753533 \div 671$	17.	$487228 \div 827$
6.	$653219 \div 394$	12.	$219763 \div 995$	18.	$701101 \div 901$

24. PROBLEMS.

1. The President of the United States receives $50000 a year; how much is that a day?

2. Fairview Park consists of 480 acres, for which $180000 was paid; how much was that per acre?

3. If 46 acres of land produce 2484 bushels of corn, how many bushels will 120 acres produce?

4. There are 30000 voters in our city; counting this as one fourth of the population, how many people have we? There are 150 precincts; that gives an average of how many votes for each precinct?

5. A farmer sold 26 dozen eggs at 22½ cents a dozen, and 16 pounds of butter at 28½ cents a pound. He received in payment 2 pounds of tea at 65 cents per pound, 3 yards of cloth at $2.50 per yard, and the remainder in money. How much money did he receive?

6. Lafayette was born in 1757, and entered the American army in 1777; how old was he at that time?

7. The total population of North America in 1890 was 80280990; that of Europe was 339668156. What was the difference in population?

8. Mt. Cenis tunnel is 7½ miles long; how many feet is that?

9. Could a vessel sail ¾ of the way round the globe in a direct line? If it could, how many miles would it sail?

10. How many cubic inches in a block of ice, which is 2 feet long, 2 feet wide, and 1 foot thick?

11. The population of Chicago in 1880 was 503189; in 1890 it was 1099850. Find the increase for ten years.

12. A milkman paid a farmer $3.20 for 10 two-gallon cans of milk. He lost 5 gallons. At what price per quart must he sell the remainder to gain 8 cents per gallon on the whole amount purchased?

HINT. 20 gallons at 8 cents = $1.60 to be gained. $3.20 + $1.60 = selling price of 15 gallons.

13. In Elgin, Ill., an average of 1200 watches are made each week-day. At that rate, how many watches are made there in a year, allowing five holidays?

14. If 60000000 bushels of wheat are harvested in Indiana this year, what will it be worth at an average of 78 cents per bushel?

15. If 8 pounds of wool are obtained from one sheep in one year, how many pounds at that rate will 48 sheep yield in 3 years? What will it be worth at 30 cents a pound?

16. 3000 cocoons make only about a pound of raw silk. To make 2 ounces would require how many cocoons?

17. Our lot fronts 221 feet of Chestnut Street, and 123 feet of Hill Street; how many yards of outside fence have we?

Our sidewalk is 5 feet wide; how many square yards of pavement have we?

18. The first locomotive was used in our country in 1829. How long ago was that?

25. Find quotients:

1. $774648 \div 186 = ?$
2. $295470 \div 190 = ?$
3. $937387 \div 184 = ?$
4. $7210473 \div 187 = ?$
5. $8043840 \div 194 = ?$
6. $842877 \div 179 = ?$
7. $145260 \div 108 = ?$
8. $1874774 \div 172 = ?$
9. $614307 \div 199 = ?$
10. $4722354 \div 178 = ?$
11. $2966607 \div 189 = ?$
12. $713513 \div 179 = ?$
13. $2154003 \div 399 = ?$
14. $1604083 \div 987 = ?$
15. $685176 \div 197 = ?$
16. $1260524 \div 159 = ?$
17. $17820 \div 294 = ?$
18. $632008 \div 196 = ?$
19. $657320 \div 178 = ?$
20. $845679 \div 168 = ?$
21. $2474420 \div 307 = ?$
22. $15604064 \div 196 = ?$
23. $583700 \div 395 = ?$
24. $3500872 \div 498 = ?$

26. ORAL REVIEW.

1. Bought a gross of penholders for 80 cents, and sold them at a cent apiece; how much was made?

2. How many square feet in a room 12 feet by 15 feet? (Drawing.)

3. At 2 cents a sheet, what will be the cost of 5 quires of paper?

4. If you are just twelve years old, how many months is that? How many weeks?

5. How many score in 10 dozen?

6. A man has a farm of 96 acres; $\frac{3}{12}$ is in one field, $\frac{4}{12}$ is in another field, and the rest is in meadow. What part is in meadow? How much is in meadow? How many acres in the two fields?

7. At 18 cents a square foot, what will be the cost of a piece of land 40 feet long and 20 feet wide?

8. If 11 cents is $\frac{1}{3}$ of the cost of a basket, what will 2 baskets cost?

9. If 8 apples cost 11 cents, how many apples can I get for $1.10.

10. How many square feet in a brick sidewalk 100 feet long and 6 feet wide? What will it cost to make such a walk at 50 cents a square yard?

11. A room is 11 feet long and 18 feet wide. What is the area of its floor? How many square yards of carpet would it take to cover it?

12. What will be the cost of a pavement 40 feet long and 9 feet wide at 30 cents a square yard?

13. What will be the cost of natural gas for 8 months on one cook-stove at $1 a month, two grates at $1.25 each per month, and one base-burner at 90 cents per month?

14. If 22 men can clear an acre of ground in 6 days, in how many days can 12 men clear it?

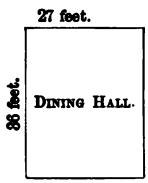
15. If a boy earns $12 a month, how much will he earn in a year? If he spends $\frac{1}{2}$ of it for clothes and board, how much will he have left?

16. Bought 10 bushels of peaches at $1 a bushel, and sold them at 30 cents a peck; how much was gained?

17. How many quarts of berries at 12 cents a quart will it take to pay for 8 yards of cloth at $16\frac{1}{2}$ cents a yard?

18. Our room is 30 feet square. How much would picture molding for it cost at 2 cents per foot? How many square feet of ceiling have we? How many square feet of surface has the floor?

27. PROBLEMS.



1. What will it cost to cover this hall with oilcloth, one yard wide, at 40 cents a yard?

2. The ceiling is 12 feet high; how many square feet in the four walls? What will it cost to paint the walls at 57 cents per square yard?

3. A town lot containing 4800 square feet is 40 feet wide on the street. How deep is it? (Drawing.)

4. If a schoolboy is 8 minutes late every day, how much time does he lose in 115 days?

5. St. Gothard tunnel is 9 miles long; how many feet long is it?

6. Abraham Lincoln was born in 1809. Between the ages of 7 and 21 he lived in southern Indiana; between what dates did he live there?

7. The number of bales of cotton produced in the United States in 1890 was 6940898, of which Texas produced 1594305 bales; how many bales were produced by the other Southern States?

28. Find quotients:

1.	246573 ÷ 1212	9.	863973 ÷ 2652	17.	631253 ÷ 3251
2.	745201 ÷ 2373	10.	915761 ÷ 2483	18.	2187923 ÷ 2473
3.	1793257 ÷ 6253	11.	3621487 ÷ 7193	19.	4267942 ÷ 8198
4.	4175959 ÷ 7329	12.	8724165 ÷ 3998	20.	4250963 ÷ 9876
5.	9180257 ÷ 6351	13.	2153897 ÷ 8253	21.	7953621 ÷ 9957
6.	7221483 ÷ 992	14.	11853221 ÷ 8123	22.	2170821 ÷ 6125
7.	1250921 ÷ 9253	15.	5995871 ÷ 6751	23.	84371285 ÷ 695
8.	27263579 ÷ 1371	16.	42507633 ÷ 8952	24.	97239643 ÷ 9853

29. MISCELLANEOUS PROBLEMS.

1. Rhode Island contains 1085 square miles, Montana 145310 square miles; how many States as large as Rhode Island could be made out of Montana, and how many square miles will be left over?

2. A miller purchased 2149 bushels of wheat, weighing 128940 pounds. What was the weight of 1 bushel?

3. A road was constructed at a cost of $4328 per mile, and the total cost was $8331400; how many miles long is the road?

4. In 1890 South Dakota raised 21152000 bushels of wheat. How many bushels would that be for each of the 2251 people in Bismarck, and how many bushels over?

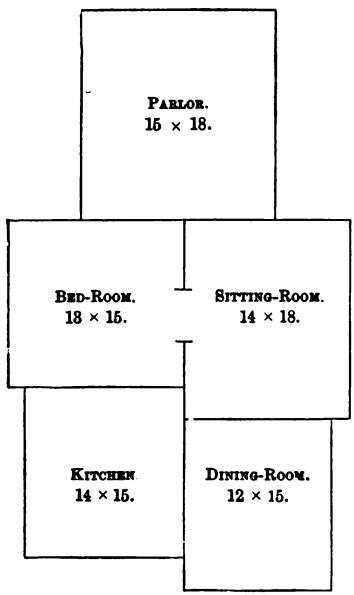
5. In one cubic foot there are 1728 cubic inches. How many cubic feet are there in a pile of wood containing 13939776 cubic inches?

6. In 1890 the mining products of the United States were estimated at $256258276, and the manufacturing products $6443495029; what was the difference in their value?

7. If a certain State has 2324 public schools, and the apportionment of school money is $7030100, what would be the average cost per school?

8. How many church bells, weighing 3421 lbs. each, can be made from 2753905 lbs. of bell metal?

9. (*a*) How many square feet in each of the rooms on the ground floor of this house?



(*b*) How much will it cost to cover these floors with yard-wide material at the following prices: Parlor carpet at $1.25 per yard; sitting and bedroom matting at 65 cents per yard; dining room and kitchen oilcloth at 95 cents per yard?

(*c*) What will it cost for picture molding for all the rooms, except the kitchen, at 12 cents a yard?

10. What time elapsed from the battle of Lexington, 1775, to the firing upon Fort Sumter, 1861?

11. If I buy real estate for $854657, agreeing to pay for it in yearly payments of $37159 each, how many payments will I make?

12. The improved land of the United States is estimated at 207198720 acres; how many townships of 23040 acres each could be made from this land?

13. In a pile of 4701625 bricks how many loads are there, if each load contains 1000 bricks?

14. Charlie saw a box car marked "Weight 28000 pounds." A ton is 2000 pounds. What is the weight of the car in tons?

15. What will be the cost of whitening the ceiling and walls of a schoolroom 44 feet long, 28 feet wide, and 13 feet high, at 5 cents a square yard, if 20 square yards are deducted for doors, windows, and baseboards?

16. Find the sum of sixteen million one thousand twenty, twelve million one hundred twenty-eight, nine million thirteen thousand two, seven million sixteen thousand seven, and three hundred million nine.

17. How many years from the Centennial exhibit at Philadelphia in 1876 to the Columbian exhibit at Chicago in 1893?

18. In a field of turnips there are 296 rows, and each row yields 18 bushels. How many loads of 30 bushels each in the field?

19. $557283 added to a certain number of dollars will produce $1157003; what is the number?

20. If 68 pounds of coal are consumed in carrying a train one mile, how many pounds will be consumed at that rate in going 1894 miles?

21. What is the weight of a train of six cars if the baggage car weighs 6000 pounds, the express car 58000 pounds, the sleeping car 80000 pounds, and each of three passenger cars 54000 pounds? How many tons is that?

30. DIVISORS AND MULTIPLES.

What integer greater than 1 will exactly divide 12, 20, and 24? 4 will divide each of these numbers, and is called a common divisor; it is a divisor common to all of them. What number greater than 1 will exactly divide 25, 30, and 35?

31. A *Common Divisor* of two or more numbers is any whole number greater than 1, which will exactly divide each of them.

Find the greatest number which will exactly divide 18, 27, and 36. 9 is the greatest common divisor of these numbers.

What is the greatest common divisor of 30, 45, 60, and 90?

32. The *Greatest Common Divisor* of two or more numbers is the greatest exact divisor of each of them.

The product of all the prime factors common to two or more numbers is their *Greatest Common Divisor* (G. C. D.).

33. Find the greatest common divisor of 70 and 180.

Separate the numbers into their prime factors. The prime factors common to 70 and 180 are 2 and 5. 10 is the product of 2 and 5, and is the *greatest common divisor* of 70 and 180.

$70 = 2 \times 7 \times 5.$
$180 = 2 \times 9 \times 5 \times 2$
$2 \times 5 = 10$, G. C. D.

Find the greatest common divisor of:

1. 84 and 90
2. 36 and 78
3. 36 and 90
4. 65 and 91
5. 48 and 128
6. 24 and 105
7. 63 and 108
8. 64 and 114
9. 56 and 126
10. 39 and 273
11. 120 and 132
12. 125 and 175
13. 150 and 275
14. 126 and 264
15. 216 and 360
16. 182 and 196
17. 42, 133, and 56
18. 32, 48, and 128
19. 56, 63, and 315
20. 96, 48, 60, and 108
21. 75, 225, and 500

34. MULTIPLES.

Name a number that is 3 times 9. 27 is a *Multiple* of 9; it is also a multiple of 3. A multiple of 3 is the product of 3 multiplied by any whole number. A multiple of 9 is any number of times 9. 24, 21, and 28 are multiples of what numbers?

35. A *Multiple of a Number* is any integral (or whole) number of times that number.

Find the multiples which 3 and 5 have in common. Of the common multiples 15, 30, 45, and 60, which is the least?

36. A multiple that is common to two or more numbers is called a *Common Multiple*, and the least of the common multiples is called the *Least Common Multiple* (L. C. M.).

37. Find the L. C. M. of 27, 24, and 30.

$$27 = 3 \times 3 \times 3$$
$$24 = 3 \times 2 \times 2 \times 2$$
$$30 = 3 \times 2 \times 5$$
$$2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 = 1080, \text{ L. C. M.}$$

Resolve 27, 24, and 30 into their prime factors. Select the different factors and repeat each as many times as it is found in any *one* of the numbers. The product of 2, 2, 2, 3, 3, 3, and 5 is the L. C. M. of 27, 24, and 30.

A multiple of a number must contain at least all the prime factors of that number.

The least common multiple of two or more numbers must contain all the prime factors that enter into each of them, and no others.

Find the L. C. M. of:

1. 42, 48, and 54	8. 44, 88, and 108	15. 148, 164, and 248
2. 14, 24, and 36	9. 30, 45, and 60	16. 548, 624, and 680
3. 26, 32, and 36	10. 17, 51, and 119	17. 308, 416, and 456
4. 12, 18, and 96	11. 21, 43, and 63	18. 432, 528, and 564
5. 24, 63, and 84	12. 120, 180, and 240	19. 28, 72, 84, and 96
6. 27, 33, and 54	13. 236, 284, and 320	20. 32, 48, 60, and 72
7. 20, 36, and 54	14. 482, 520, and 564	21. 32, 36, 49, and 56

38. CANCELLATION.

Find the quotient of 4×6 divided by 2×6. Of 4×8 divided by 2×8.

$(4 \times 7) \div (2 \times 7) = ?$ $\quad (6 \times 8) \div (3 \times 8) = ?$

2 times any number is contained in 4 times that number, how many times?

$(6 \times 7) \div (3 \times 7) = ?$ $\quad (9 \times 5) \div (3 \times 5) = ?$

3×9 is contained in 6×9 as many times as 3 is contained in what? 3 times any number is contained how many times in 6 times that number?

39. To find quotients by the shortest method, strike out equal factors from the dividend and the divisor.

Divide:

9×7 by 3×7	8×9 by 4×9	8×11 by 2×11
12×5 by 6×5	9×6 by 3×6	9×9 by 3×9

Dividing both dividend and divisor by the same number does not affect the quotient.

The process of striking out equal factors from the dividend and the divisor is called *Cancellation*.

40. Divide $18 \times 5 \times 6$ by $7 \times 4 \times 5$.

Cancel the common factor 5 from both dividend and divisor, and the common factor 2 from 6 in the dividend and 4 in the divisor. Cancel the remaining factor 2 from the 4 in the divisor with the factor 2 in 18 in the dividend. The product of the factors remaining in the dividend is 27, and of those in the divisor, 7. 27 divided by 7 gives the quotient $3\frac{6}{7}$.

$$\frac{\overset{9}{\cancel{18}} \times \cancel{5} \times \overset{3}{\cancel{6}}}{7 \times \underset{2}{\cancel{4}} \times \cancel{5}} = \frac{27}{7} = 3\frac{6}{7}$$

Divide $9 \times 2 \times 6$ by $6 \times 6 \times 3$.

NOTE. When the divisor equals the dividend, the quotient is 1. This result will be found when all the factors of the dividend and the divisor are canceled.

$\frac{18 \times 6 \times 9}{10 \times 7 \times 6}$	$\frac{27 \times 6 \times 2 \times 7}{18 \times 3 \times 4 \times 2}$	$\frac{75 \times 9 \times 96}{12 \times 15 \times 9}$
$\frac{14 \times 7 \times 5}{15 \times 6 \times 2}$	$\frac{25 \times 9 \times 6 \times 5}{18 \times 6 \times 4 \times 3}$	$\frac{87 \times 15 \times 9}{5 \times 9 \times 29}$
$\frac{16 \times 9 \times 21}{15 \times 12 \times 4}$	$\frac{18 \times 22 \times 28}{21 \times 33 \times 7}$	$\frac{51 \times 54 \times 12}{36 \times 17 \times 3}$

41. PROBLEMS.

1. How many pounds of sugar at 6 cents a pound can be bought for 9 yards of calico at 12 cents a yard?

$\frac{9 \times 12}{6} = 18$

9×12 cents equals the cost of the calico. As many pounds of sugar must be given for the calico as there are 6 cents in 9×12 cents.

2. How many pairs of shoes at $3.00 a pair must be given in exchange for 30 bushels of potatoes at 50 cents a bushel?

3. A farmer sold to a grocer 19 bushels of apples at 75 cents a bushel, and took his pay in coffee at 30 cents a pound. How many pounds did he receive?

4. A milkman sells daily 50 quarts of milk at 6 cents a quart. How many yards of carpet at 90 cents a yard can be bought for the milk sold in 7 days?

5. For 12 days' work of 8 hours each a workman received $24. How much at that rate would he receive for 18 days' work of 9 hours each?

6. Mr. Jones sold 121 pounds of beef at 14 cents a pound, and took his pay in potatoes at 77 cents a bushel; how many bushels did he receive?

7. On each of 6 days a grocer sold 150 pounds of sugar at 8 cents a pound. How many pounds of tea must he sell on each of 4 days at 60 cents a pound to equal the amount he received for the sugar?

8. Make a problem for 24 divided by 3×2.

9. Make a problem for 45 divided by 3×5.

CHAPTER IV.

COMMON FRACTIONS.

1. A *Fraction* is one or more of the equal parts of a unit.

One of the equal parts into which the unit is divided is a fractional unit. The value of a fraction depends both upon the size of the fractional unit and the number of fractional units expressed.

How many halves in a dollar? an apple? a bushel? a mile? How many thirds in an orange? a loaf of bread? How many sevenths in a peck? in a quart?

2. A *fraction* is expressed by two numbers, one written under the other, with a horizontal line between them; as, $\frac{2}{3}$, $\frac{1}{5}$, $\frac{1}{8}$, etc.

The number below the line shows the number of equal parts into which the unit is divided; it is called the *Denominator*.

The number above the line shows the number of equal parts taken in the fractional number; it is called the *Numerator*. The numerator and denominator are called the *Terms* of a fraction.

3. Read the following fractions. In each case tell into how many parts the unit is divided.

$\frac{6}{9}$ $\frac{7}{12}$ $\frac{4}{11}$ $\frac{5}{8}$ $\frac{4}{13}$ $\frac{9}{15}$ $\frac{7}{19}$ $\frac{9}{16}$ $\frac{12}{17}$

$\frac{10}{18}$ $\frac{17}{20}$ $\frac{16}{18}$ $\frac{14}{25}$ $\frac{16}{25}$ $\frac{15}{24}$ $\frac{12}{28}$ $\frac{13}{28}$ $\frac{17}{27}$

$\frac{16}{30}$ $\frac{29}{35}$ $\frac{35}{40}$ $\frac{26}{30}$ $\frac{27}{30}$ $\frac{31}{50}$ $\frac{27}{58}$ $\frac{35}{63}$ $\frac{23}{32}$

Express the following in figures:

Six ninths.
Seven elevenths.
Nine twelfths.
Ten fourteenths.
Six thirteenths.
Seven twenty-fifths.
Eight nineteenths.
Nine thirtieths.
Seven thirty-fourths.
Twelve twenty-eighths.
Sixteen fiftieths.
Fourteen fortieths.
Twenty forty-ninths.
Nineteen forty-fifths.
Twenty-nine sixtieths.

4. A *Proper Fraction* is one whose value is less than *one;* as, $\frac{1}{5}$, $\frac{2}{7}$, $\frac{1}{9}$. The numerator of a proper fraction is less than the denominator.

5. An *Improper Fraction* is one whose value is equal to, or greater than, *one;* as, $\frac{4}{4}$, $\frac{7}{5}$, $\frac{8}{3}$. The numerator is equal to, or greater than, the denominator.

6. A *Mixed Number* is an integer and a fraction united; as, $3\frac{1}{4}$, $4\frac{2}{3}$, $29\frac{5}{6}$.

7. To reduce integers and mixed numbers to fractions.

How many fourths in an orange? How many fourths in 6 oranges? How many fifths in a melon? In 3 melons?

In one melon there are five fifths; in 3 melons there are three times five fifths.

How many sevenths in 4? In 6? In 8?

How many thirds in $3\frac{1}{3}$ loaves of bread?

In one loaf there are three thirds. In three loaves there are nine thirds. Nine thirds and one third are ten thirds. There are ten thirds in $3\frac{1}{3}$ loaves of bread.

How many sixths in $4\frac{2}{6}$? $3\frac{4}{6}$? $5\frac{1}{6}$?

How many sevenths in $4\frac{1}{7}$? $6\frac{2}{7}$? $8\frac{3}{7}$?

How many tenths in $3\frac{9}{10}$? $6\frac{3}{10}$? $5\frac{2}{10}$?

How many ninths in 14 apples?

1 apple $= \frac{9}{9}$.

14 apples $=$ 14 times $\frac{9}{9} = \frac{126}{9}$. *Ans.*

Reduce to improper fractions:

1. $25\frac{4}{11}$
2. $36\frac{3}{13}$
3. $45\frac{4}{15}$
4. $94\frac{3}{14}$
5. $86\frac{2}{15}$
6. $92\frac{3}{16}$
7. $136\frac{4}{5}$
8. $342\frac{7}{8}$
9. $425\frac{5}{8}$
10. $98\frac{9}{20}$
11. $87\frac{3}{30}$
12. $75\frac{4}{60}$
13. $67\frac{16}{100}$
14. $92\frac{84}{100}$
15. $78\frac{3}{200}$
16. $143\frac{13}{200}$
17. $294\frac{25}{300}$
18. $673\frac{88}{1000}$

8. Reduce $14\frac{7}{9}$ to ninths.

$1 = \frac{9}{9}$. $14 =$ 14 times $\frac{9}{9} = \frac{126}{9}$. $\frac{126}{9} + \frac{7}{9} = \frac{133}{9}$. *Ans.*

Reduce:

1. $18\frac{2}{3}$ to thirds.
2. $25\frac{1}{6}$ to sixths.
3. $28\frac{4}{5}$ to fifths.
4. $49\frac{3}{7}$ to sevenths.
5. $53\frac{2}{9}$ to ninths.
6. $64\frac{7}{12}$ to twelfths.

Write a rule for reducing a mixed number to a fraction.

9. To reduce fractions to integers or mixed numbers.

How many yards in six half-yards? How many apples in nine half-apples? How many pears in 11 half-pears?

There are two half-pears in one pear. In 11 half-pears there are as many pears as there are 2's in 11.

2) 11

$5\frac{1}{2}$ times. There are $5\frac{1}{2}$ pears in 11 half-pears.

How many gallons in 26 half-gallons? How many bushels in 17 half-bushels?

How many melons in 18 thirds of a melon?

How many yards in 18 thirds of a yard?

How many ones in 20 fifths? In 28 fourths? In 26 sevenths? In 25 eighths? In 35 ninths? In 86 elevenths? In 96 twelfths? In 89 tenths? In $\frac{37}{9}$? In $\frac{56}{8}$? In $\frac{72}{7}$? In $\frac{95}{10}$? In $\frac{85}{12}$? In $\frac{45}{15}$? In $\frac{100}{10}$?

Write a rule for changing an improper fraction to an integer or a mixed number.

Reduce to an integer or a mixed number:

1. $\frac{160}{12}$ 3. $\frac{234}{9}$ 5. $\frac{800}{20}$ 7. $\frac{175}{24}$ 9. $\frac{848}{25}$ 11. $\frac{608}{30}$ 13. $\frac{248}{48}$ 15. $\frac{1000}{35}$

2. $\frac{124}{16}$ 4. $\frac{860}{15}$ 6. $\frac{430}{60}$ 8. $\frac{264}{30}$ 10. $\frac{630}{21}$ 12. $\frac{946}{50}$ 14. $\frac{1005}{30}$ 16. $\frac{4500}{100}$

10. To reduce fractions to lowest terms.

One fifth of a dollar is how many cents? Two tenths of a dollar? $\frac{1}{5}$ is how many tenths?

$\frac{1}{3}$ of a yard is how many inches? $\frac{1}{3}$ is how many sixths?

$\frac{4}{6}$ are how many thirds?

How many fourths in $\frac{6}{8}$ of an apple?

NOTE. If necessary, these equivalent fractions should be illustrated by folding strips of paper or paper discs.

$\frac{6}{10}$ are equal to how many fifths?

Change the form of the fraction, not the value, by increasing the *size*, and reducing the *number* of parts into which the unit is divided.

$\frac{1}{5} = \frac{2}{10}$. 6 tenths are equal to as many fifths as there are $\frac{2}{10}$ in $\frac{6}{10}$. $\frac{2}{10}$ in $\frac{6}{10}$ three times. There are three fifths in $\frac{6}{10}$.

The form of the fraction may be changed without changing its value, by dividing both terms by the same number.

$$\frac{6 \div 2 = 3}{10 \div 2 = 5}$$

Reduce $\frac{8}{12}$ and $\frac{4}{16}$, each to fourths.

Reduce $\frac{6}{21}$, $\frac{9}{21}$, and $\frac{18}{21}$, each to sevenths.

Reduce $\frac{18}{24}$, $\frac{12}{36}$, $\frac{18}{48}$, and $\frac{20}{40}$, each to eighths.

Reduce $\frac{9}{27}$, $\frac{6}{18}$, $\frac{16}{36}$, and $\frac{5}{45}$, each to ninths.

When a fraction is reduced to an equivalent fraction, with smaller terms, it is reduced to *lower terms*.

11. A fraction is in its *lowest terms* when no integer, except 1, will exactly divide both numerator and denominator.

Reduce $\frac{64}{96}$ to lowest terms.

$$\frac{64 \div 8}{96 \div 8} = \frac{8}{12}. \quad \frac{8 \div 4}{12 \div 4} = \frac{2}{3}. \quad \textit{Ans.}$$

The same result will be obtained by dividing both terms by 32, the greatest number which will exactly divide both terms.

Reduce to lowest terms:

1. $\frac{55}{98}$ 3. $\frac{41}{164}$ 5. $\frac{59}{177}$ 7. $\frac{96}{100}$ 9. $\frac{82}{256}$ 11. $\frac{84}{252}$ 13. $\frac{148}{200}$ 15. $\frac{144}{288}$
2. $\frac{12}{81}$ 4. $\frac{48}{144}$ 6. $\frac{72}{108}$ 8. $\frac{84}{196}$ 10. $\frac{64}{192}$ 12. $\frac{186}{408}$ 14. $\frac{281}{880}$ 16. $\frac{75}{800}$

Make a rule for changing a fraction to its lowest terms.

12. **To reduce fractions to higher terms.**

One fourth of an apple is how many eighths?

$\frac{3}{4}$ are how many eighths? $\frac{2}{4}$? $\frac{5}{4}$? $\frac{7}{4}$? $\frac{11}{4}$?

One third is how many ninths? $\frac{4}{3}$?

$\frac{1}{3} = \frac{3}{9}$. $\frac{4}{3} = 4$ times $\frac{3}{9}$ which are $\frac{12}{9}$.

Change $\frac{8}{9}$ to eighteenths, $\frac{5}{12}$ to twenty-fourths, $\frac{6}{30}$ to sixtieths, $\frac{7}{24}$ to forty-eighths, $\frac{7}{36}$ to seventy-seconds.

When a fraction is changed to an equivalent fraction with greater terms, it is reduced to *higher terms*.

13. Change $\frac{3}{4}$, $\frac{5}{6}$, and $\frac{3}{8}$ to equivalent fractions having the same denominator.

$$\frac{3 \times 6}{4 \times 6} = \frac{18}{24} \qquad \frac{5 \times 4}{6 \times 4} = \frac{20}{24} \qquad \frac{3 \times 3}{8 \times 3} = \frac{9}{24}$$

When several fractions have the same denominator, they have a *common denominator*.

Reduce to equivalent fractions with a common denominator:

1. $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$. 3. $\frac{7}{5}$, $\frac{5}{8}$, $\frac{2}{3}$. 5. $\frac{3}{5}$, $\frac{7}{10}$, $\frac{8}{15}$. 7. $\frac{7}{8}$, $\frac{3}{16}$, $\frac{1}{4}$.
2. $\frac{3}{4}$, $\frac{5}{8}$, $\frac{1}{6}$. 4. $\frac{3}{7}$, $\frac{2}{14}$, $\frac{4}{21}$. 6. $\frac{5}{12}$, $\frac{3}{8}$, $\frac{5}{24}$. 8. $\frac{4}{9}$, $\frac{13}{18}$, $\frac{4}{36}$.

14. The common denominator must be a common multiple of the denominators given. The least common denominator must be the l. c. m. of the denominators given.

Reduce to equivalent fractions having a least common denominator:

1. $\frac{3}{4}$, $\frac{3}{8}$, $\frac{1}{2}$.
2. $\frac{2}{3}$, $\frac{1}{6}$, $\frac{5}{6}$.
3. $\frac{1}{4}$, $\frac{3}{8}$, $\frac{7}{8}$.
4. $\frac{3}{7}$, $\frac{5}{9}$, $\frac{1}{14}$.
5. $\frac{4}{5}$, $\frac{9}{10}$, $\frac{1}{15}$.
6. $\frac{3}{7}$, $\frac{5}{12}$, $\frac{4}{9}$.
7. $\frac{1}{6}$, $\frac{3}{8}$, $\frac{5}{9}$.
8. $\frac{2}{5}$, $\frac{5}{131}$, $\frac{13}{65}$.

15. ADDITION OF FRACTIONS.

Harry gave $\frac{1}{5}$ of a melon to John, $\frac{1}{5}$ to George, and $\frac{2}{5}$ to Helen; how many fifths of the melon did he give away?

Jane gave $\frac{1}{4}$ of a dollar for some card-board, and $\frac{1}{5}$ of a dollar for some needles; what part of a dollar did she spend?

$\frac{1}{4} = \frac{5}{20}$. $\quad \frac{1}{5} = \frac{4}{20}$. $\quad \frac{5}{20} + \frac{4}{20} = \frac{9}{20}$. *Ans.*

Only like fractions can be added.

To add fractions: Change the fractions to equivalent fractions having a common denominator, add their numerators, and write the sum over the common denominator.

Find the sum of:

1. $\frac{2}{3}$ and $\frac{2}{7}$.
2. $\frac{3}{4}$ and $\frac{1}{8}$.
3. $\frac{2}{7}$ and $\frac{5}{8}$.
4. $\frac{2}{3}$ and $\frac{3}{8}$.
5. $\frac{1}{6}$ and $\frac{5}{9}$.
6. $\frac{3}{4}$ and $\frac{3}{5}$.
7. $\frac{1}{8}$ and $\frac{5}{9}$.
8. $\frac{2}{3}$ and $\frac{3}{10}$.
9. $\frac{3}{7}$ and $\frac{5}{11}$.
10. $\frac{5}{8}$ and $\frac{5}{13}$.
11. $\frac{3}{4}$ and $\frac{4}{15}$.
12. $\frac{6}{7}$ and $\frac{7}{8}$.

16. Add $\frac{2}{3}$, $\frac{5}{6}$, and $\frac{7}{12}$.

$\frac{2}{3} = \frac{8}{12}$. $\frac{5}{6} = \frac{10}{12}$. $\frac{8}{12} + \frac{10}{12} + \frac{7}{12} = \frac{25}{12} = 2\frac{1}{12}$. *Ans.*

What is the sum of $13\frac{2}{3}$, $18\frac{1}{4}$, and $14\frac{1}{2}$?

$13\frac{2}{3}$	$\frac{8}{12}$
$18\frac{1}{4}$	$\frac{3}{12}$
$14\frac{1}{2}$	$\frac{6}{12}$
$46\frac{5}{12}$	$\frac{17}{12} = 1\frac{5}{12}$

Ans.

To add mixed numbers:

Add the fractions and the integers separately, and combine the results.

Add the following:

(1) $\frac{2}{3}$, $\frac{5}{6}$, $\frac{7}{10}$.
(2) $\frac{2}{3}$, $\frac{3}{4}$, $\frac{2}{5}$.
(3) $\frac{2}{3}$, $\frac{3}{5}$, $\frac{7}{8}$.
(4) $\frac{5}{6}$, $\frac{7}{8}$, $\frac{4}{9}$.
(5) $\frac{5}{6}$, $\frac{4}{5}$, $\frac{11}{15}$.
(6) $\frac{2}{5}$, $\frac{7}{10}$, $\frac{11}{20}$.
(7) $\frac{7}{10}$, $\frac{8}{15}$, $\frac{11}{15}$.
(8) $\frac{5}{9}$, $\frac{7}{12}$, $\frac{8}{15}$.
(9) $45\frac{1}{2}$, $67\frac{3}{4}$, $62\frac{3}{8}$.
(10) $37\frac{1}{2}$, $18\frac{2}{3}$, $16\frac{3}{4}$.
(11) $30\frac{1}{4}$, $66\frac{1}{7}$, $84\frac{3}{4}$.
(12) $25\frac{1}{8}$, $16\frac{3}{5}$, $14\frac{1}{2}$.

17. SUBTRACTION OF FRACTIONS.

Frank had $\frac{2}{3}$ of an orange: he gave $\frac{1}{3}$ to George; what part of the orange had he left?

Helen had $\frac{5}{6}$ of a yard of ribbon; she gave $\frac{1}{2}$ a yard to Mary; what part of a yard had she left?

$\frac{1}{2} = \frac{3}{6}$. $\frac{5}{6} - \frac{3}{6} = \frac{2}{6} = \frac{1}{3}$. She had $\frac{1}{3}$ of a yard left.

Minuend and Subtrahend must be like numbers.

To subtract fractions:

Change the fractions to equivalent fractions having a common denominator. Subtract the numerator of the subtrahend from the numerator of the minuend, and write the difference over the common denominator.

Subtract:

1. $\frac{2}{3} - \frac{1}{4} = ?$	6. $\frac{6}{7} - \frac{2}{5} = ?$	11. $\frac{9}{14} - \frac{3}{7} = ?$
2. $\frac{5}{6} - \frac{2}{3} = ?$	7. $\frac{3}{4} - \frac{1}{3} = ?$	12. $\frac{2}{7} - \frac{2}{6} = ?$
3. $\frac{4}{5} - \frac{3}{4} = ?$	8. $\frac{7}{10} - \frac{2}{5} = ?$	13. $\frac{9}{12} - \frac{3}{4} = ?$
4. $\frac{11}{12} - \frac{5}{6} = ?$	9. $\frac{7}{8} - \frac{4}{7} = ?$	14. $\frac{9}{15} - \frac{3}{5} = ?$
5. $\frac{8}{9} - \frac{5}{8} = ?$	10. $\frac{16}{21} - \frac{5}{7} = ?$	15. $\frac{11}{12} - \frac{8}{9} = ?$

18. Subtract $18\frac{3}{4}$ from $36\frac{1}{3}$.

$$\begin{array}{l} 5 \\ 36\frac{1}{3} \\ 18\frac{3}{4} \\ \hline 17\frac{7}{12}. \quad \textit{Ans.} \end{array} \qquad 1\frac{1}{3} = \frac{4}{3} = 1\frac{8}{12}. \quad {}^{9}_{12}$$

$\frac{3}{4}$ cannot be taken from $\frac{1}{3}$. Take **1** from 36, which leaves 35.

Subtract:

1. $16\frac{1}{4} - 13\frac{1}{3} = ?$	4. $23\frac{5}{8} - 8\frac{2}{7} = ?$	7. $14\frac{4}{7} - 9\frac{2}{3} = ?$
2. $24\frac{1}{6} - 18\frac{1}{2} = ?$	5. $26\frac{1}{3} - 16\frac{1}{7} = ?$	8. $33\frac{1}{3} - 25\frac{4}{7} = ?$
3. $10\frac{1}{9} - 8\frac{1}{8} = ?$	6. $25\frac{5}{6} - 18\frac{3}{4} = ?$	9. $66\frac{2}{3} - 45\frac{3}{8} = ?$

19. 1. A man divided his property among his five children, giving $\frac{1}{3}$ of it to the first, $\frac{1}{8}$ to the second, $\frac{1}{4}$ to the third, and $\frac{1}{12}$ to the fourth; what part did the fifth child receive?

2. $\frac{2}{9}$ of my library is History, $\frac{3}{12}$ Poetry, $\frac{1}{4}$ Science, and the remainder Fiction; what part is Fiction?

3. If a tailor uses $3\frac{3}{4}$ yards for a coat, $2\frac{1}{2}$ yards for trousers, and $\frac{7}{8}$ yard for a vest, how many yards are used in all?

4. I owe $\$6\frac{1}{3}$. If I pay $\frac{3}{4}$ of a dollar, how much shall I then owe?

5. If from $\$8\frac{1}{4}$ there be taken $\$6\frac{2}{5}$, how much will remain?

20. MULTIPLICATION OF FRACTIONS.

Fractions multiplied by integers.

If a yard of cloth cost $\frac{3}{4}$ of a dollar, what will 3 yards cost?

3 yards will cost 3 times $\frac{3}{4}$ of a dollar, which are $\frac{9}{4}$ of a dollar = $2\frac{1}{4}$ dollars. Prove this by finding 3 times the number of cents which $\frac{3}{4}$ of a dollar equal.

If Mary learns $\frac{2}{3}$ of a page of spelling in a day, how many pages will she learn in 4 days?

Multiply:

1. $\frac{2}{3}$ by 5.	4. $\frac{3}{5}$ by 9.	7. $\frac{3}{14}$ by 15.	10. $6\frac{1}{3}$ by 8.
2. $\frac{3}{4}$ by 6.	5. $\frac{5}{8}$ by 7.	8. $\frac{3}{15}$ by 12.	11. $7\frac{2}{3}$ by 9.
3. $\frac{7}{8}$ by 4.	6. $\frac{3}{7}$ by 12.	9. $4\frac{4}{5}$ by 6.	12. $5\frac{1}{6}$ by 7.

NOTE. Multiply the fraction and the integer separately and add the products.

21. Integers multiplied by fractions.

1 time 9 pears is 9 pears. Will $\frac{1}{3}$ of 9 pears be more or less than 1 time 9? 9 pears multiplied by $\frac{1}{3}$ is $\frac{1}{3}$ *of* 9 pears, which is 3 pears. 9 pears multiplied by $\frac{2}{3}$ is $\frac{2}{3}$ *of* 9 pears, which are 6 pears.

$36 \times \frac{3}{4} = \frac{3}{4}$ *of* 36. $\frac{1}{4}$ of 36 = 9. $\frac{3}{4}$ of 36 equals 3 times 9, which are 27. $36 \times \frac{3}{4} = 27$.

Multiply:

1. 24 by $\frac{2}{3}$	4. 18 by $\frac{5}{6}$	7. 84 by $\frac{3}{7}$
2. 40 by $\frac{3}{5}$	5. 19 by $\frac{1}{3}$	8. 72 by $\frac{3}{8}$
3. 36 by $\frac{5}{6}$	6. 56 by $\frac{3}{8}$	9. 96 by $\frac{3}{8}$

22. Fractions multiplied by fractions.

How much is $\frac{1}{3}$ of $\frac{3}{4}$ of an apple? Is it more or less than 1 time $\frac{3}{4}$?

$\frac{3}{4} \times \frac{1}{3}$ equals $\frac{1}{3}$ *of* $\frac{3}{4}$. $\frac{1}{3}$ of $\frac{3}{4}$ is $\frac{1}{4}$.

How much is $\frac{3}{4}$ of $\frac{2}{3}$? Is it more or less than 1 time $\frac{2}{3}$?

$\frac{3}{3} \times \frac{3}{4}$ equals $\frac{3}{4}$ of $\frac{3}{3}$. $\frac{1}{4}$ of $\frac{3}{3}$ is $\frac{2}{12}$; $\frac{3}{4}$ is 3 times $\frac{2}{12}$, which is $\frac{6}{12} = \frac{1}{2}$. $\frac{3}{4} \times \frac{2}{3} = \frac{1}{2}$. *Ans.*

What is the cost of $\frac{3}{4}$ of a yard of silk, at $\frac{4}{5}$ of a dollar a yard? If the silk were \$1 a yard, would $\frac{3}{4}$ of a yard cost more or less than $\frac{4}{5}$ of a dollar?

One yard costs $\frac{4}{5}$ of a dollar.

$\frac{1}{4}$ of a yard costs $\frac{1}{4}$ of $\frac{4}{5}$, which is $\frac{4}{20}$ of one dollar.

$\frac{3}{4}$ of a yard costs 3 times $\frac{4}{20}$, which is $\frac{12}{20} = \frac{3}{5}$ of a dollar.

Prove this by giving the price of one yard in *cents*, instead of in the fractional parts of a dollar.

Short Process. $\frac{3}{4} \times \frac{4}{5} = \frac{12}{20} = \frac{3}{5}$. *Ans.*

23. To multiply one fraction by another.

Multiply the numerators together for a new numerator, and the denominators together for a new denominator, and reduce the resulting fraction to its lowest terms.

NOTE. Show how the process may be shortened in this case by cancellation.

Multiply:

1.	$\frac{5}{6}$ by $\frac{3}{4}$.	6.	$\frac{4}{7}$ by $\frac{7}{8}$.	11.	$\frac{4}{7}$ by $\frac{3}{8}$.	16.	$\frac{5}{14}$ by $\frac{4}{5}$.
2.	$\frac{7}{8}$ by $\frac{5}{6}$.	7.	$\frac{4}{5}$ by $\frac{8}{9}$.	12.	$\frac{5}{6}$ by $\frac{8}{9}$.	17.	$\frac{9}{13}$ by $\frac{3}{4}$.
3.	$\frac{3}{5}$ by $\frac{4}{9}$.	8.	$\frac{6}{7}$ by $\frac{8}{9}$.	13.	$\frac{3}{5}$ by $\frac{5}{9}$.	18.	$\frac{7}{25}$ by $\frac{1}{8}$.
4.	$2\frac{1}{2}$ by $\frac{2}{3}$.	9.	$6\frac{1}{4}$ by $\frac{1}{2}$.	14.	$6\frac{1}{4}$ by $2\frac{1}{2}$.	19.	$6\frac{1}{4}$ by $6\frac{1}{4}$.
5.	$3\frac{1}{3}$ by $\frac{3}{4}$.	10.	$2\frac{1}{2}$ by $2\frac{1}{2}$.	15.	$5\frac{3}{5}$ by $3\frac{1}{2}$.	20.	$8\frac{3}{5}$ by $8\frac{3}{5}$.

24. 1. If a man mows $\frac{7}{8}$ of an acre in a day, how much does he mow in $\frac{1}{7}$ of a day?

2. What is the cost of $\frac{4}{5}$ of a yard of flannel, at $\frac{1}{8}$ of a dollar a yard?

3. If silk is worth $\frac{6}{7}$ of a dollar a yard, what is $\frac{5}{8}$ of a yard worth?

4. If a knife is worth $\frac{9}{10}$ of a dollar, and a slate $\frac{5}{6}$ as much, what is the slate worth?

5. At $\frac{5}{8}$ of a dollar a pound, what is $\frac{7}{15}$ of a pound of tea worth?

6. If 4 yards of velvet cost $\$6\frac{1}{4}$, how much more than $\$8$ will 12 yards cost?

7. The captain of a merchant ship owns $\frac{2}{5}$ of the cargo, the first mate $\frac{3}{10}$, and the second mate $\frac{3}{4}$ of the remainder; what part of the whole does the second mate own?

8. At the rate of $9\frac{1}{3}$ miles an hour, how far can a boy ride on a bicycle in $3\frac{3}{4}$ hours in the forenoon and $2\frac{2}{3}$ hours in the afternoon?

25. DIVISION OF FRACTIONS.

Fractions divided by integers.

Mary divided $\frac{3}{4}$ of a yard of ribbon equally among 3 girls; what part of a yard did each girl receive?

Each girl received $\frac{1}{3}$ of $\frac{3}{4}$ of a yard, which is $\frac{1}{4}$ of a yard.
$\frac{3}{4}$ of a yard $\div 3 = \frac{1}{4}$ of a yard.

Divide $\frac{4}{5}$ of a cake equally between 2 boys; what part of the cake does each boy receive? Divide it equally among 3 boys.

A fraction may be divided by dividing the numerator or by multiplying the denominator.

$\frac{4}{5} \div 3 = \frac{4}{5 \times 3} = \frac{4}{15}$.

What is the fractional unit in the fraction $\frac{4}{5}$? Multiplying the denominator by 3 has what effect upon the size of the fractional unit? 4 fractional units of *fifteenths* are what part of 4 fractional units of *fifths?*

26. Divide:

1. $\frac{5}{8}$ by 7.	4. $\frac{8}{9}$ by 10.	7. $\frac{14}{15}$ by 7.
2. $\frac{7}{8}$ by 9.	5. $\frac{9}{7}$ by 12.	8. $\frac{20}{21}$ by 5.
3. $\frac{6}{7}$ by 5.	6. $\frac{8}{13}$ by 6.	9. $\frac{12}{30}$ by 3.

$\frac{1}{6}$ of $26\frac{1}{5} = ?$

$\frac{1}{6}$ of $26 = 4$, with a remainder of 2. $2 = \frac{10}{5} + \frac{1}{5} = \frac{11}{5}$. $\frac{1}{6}$ of $\frac{11}{5} = \frac{11}{30}$. $\frac{1}{6}$ of $26\frac{1}{5} = 4\frac{11}{30}$.

NOTE. Divide the integer and then the fraction, and combine the results.

10. $18\frac{2}{3} \div 6 = ?$	14. $21\frac{3}{4} \div 7 = ?$	18. $14\frac{1}{3} \div 4 = ?$
11. $20\frac{2}{3} \div 5 = ?$	15. $24\frac{1}{3} \div 4 = ?$	19. $33\frac{2}{3} \div 3 = ?$
12. $26\frac{4}{5} \div 6 = ?$	16. $25\frac{3}{4} \div 5 = ?$	20. $66\frac{2}{3} \div 7 = ?$
13. $32\frac{1}{4} \div 4 = ?$	17. $46\frac{3}{4} \div 5 = ?$	21. $27\frac{2}{3} \div 7 = ?$

NOTE TO TEACHERS. Division of Fractions should be taught both as Partition and Division.

Divide $\frac{3}{4}$ of a dollar equally among 3 persons.

This is an example in *partition*. Each received $\frac{1}{3}$ of $\frac{3}{4}$ of a dollar, which is $\frac{1}{4}$ of a dollar.

At \$3 a barrel, how many barrels of apples can be bought for $\frac{3}{4}$ of a dollar?

This is an example in *division.* \$3 are not contained in $\frac{3}{4}$ of a dollar. If $\frac{3}{4}$ of a dollar be measured by \$3, it will be found that $\frac{3}{4}$ of a dollar is $\frac{1}{4}$ of enough money to contain \$3 once (or $\frac{3}{4}$ is $\frac{1}{4}$ of 3). $\frac{3}{4} \div 3 = \frac{1}{4}$ (of 1 time). At \$3 a barrel, $\frac{1}{4}$ of a barrel can be bought for $\frac{3}{4}$ of a dollar.

27. Integers divided by fractions.

How many times is $\frac{1}{4}$ of an orange contained in 2 oranges?

2 oranges $= \frac{8}{4}$ oranges. $\frac{1}{4}$ is contained in $\frac{8}{4}$ eight times. $2 \div \frac{1}{4} = 8$ (times).

How many times is $\frac{3}{4}$ of a dollar contained in 3 dollars?

3 dollars $= \frac{12}{4}$ dollars. $\frac{12}{4} \div \frac{3}{4} = 4$ (times). $\frac{3}{4}$ of a dollar is contained in 3 dollars 4 times.

Divide 17 by $\frac{2}{5}$.

$$17 = \tfrac{85}{5}. \quad \tfrac{85}{5} \div \tfrac{2}{5} = 28\tfrac{1}{2} \text{ (times)}.$$

Divide:

1. 18 by $\frac{2}{3}$.
2. 25 by $\frac{3}{4}$.
3. 25 by $\frac{7}{8}$.
4. 36 by $\frac{3}{5}$.
5. 60 by $\frac{7}{8}$.
6. 71 by $\frac{5}{8}$.
7. 54 by $\frac{3}{7}$.
8. 56 by $\frac{8}{9}$.
9. 36 by $4\frac{1}{2}$.
10. 16 by $6\frac{2}{3}$.
11. 45 by $3\frac{1}{3}$.
12. 28 by $5\frac{1}{2}$.

Make a rule for dividing an integer by a fraction.

28. Fractions divided by fractions.

How many times is $\frac{1}{3}$ of a melon contained in $\frac{2}{3}$? $\frac{1}{3}$ in $\frac{8}{3}$?

How many times are $\frac{2}{5}$ contained in $\frac{4}{5}$?

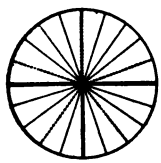
How many times is $\frac{1}{3}$ of a yard contained in $\frac{1}{2}$ of a yard?

$\frac{1}{2} = \frac{3}{6}$. $\frac{1}{3} = \frac{2}{6}$. $\frac{3}{6} \div \frac{2}{6} = 1\frac{1}{2}$ (times).

$\frac{1}{3}$ of a yard is contained in $\frac{1}{2}$ of a yard $1\frac{1}{2}$ times.

Prove this by changing each fraction of a yard to inches, and then dividing.

29. Divide $\frac{3}{4}$ by $\frac{2}{5}$.



$\frac{3}{4}$ of the circle are equal to how many twentieths?

$\frac{2}{5}$ are equal to how many twentieths?

$\frac{15}{20}$ contains $\frac{8}{20}$ how many times?

Cut the circle out of paper and measure $\frac{15}{20}$ by $\frac{8}{20}$. $\frac{15}{20} \div \frac{8}{20} = 1\frac{7}{8}$ (times).

To divide a fraction by a fraction:

Reduce to a common denominator, and divide the numerator of the dividend by the numerator of the divisor.

Divide:

1. $\frac{6}{7}$ by $\frac{3}{4}$.	4. $\frac{6}{7}$ by $\frac{3}{5}$.	7. $\frac{7}{8}$ by $\frac{5}{7}$.	10. $2\frac{1}{2}$ by $\frac{3}{5}$.
2. $\frac{8}{9}$ by $\frac{2}{3}$.	5. $\frac{5}{8}$ by $\frac{2}{3}$.	8. $6\frac{1}{2}$ by $\frac{1}{2}$.	11. 7 by $\frac{5}{6}$.
3. $\frac{4}{5}$ by $\frac{3}{4}$.	6. $7\frac{1}{2}$ by $\frac{5}{8}$.	9. $3\frac{1}{3}$ by $\frac{3}{5}$.	12. 9 by $\frac{3}{7}$.

Inverting the divisor.

Divide $\frac{3}{4}$ by $\frac{2}{3}$.

$\frac{3}{4}$ divided by 2 equals $\frac{3}{8}$. The divisor is $\frac{1}{3}$ of 2, and the quotient must be 3 times $\frac{3}{8}$, which are $\frac{9}{8} = 1\frac{1}{8}$. This may be expressed by "inverting the divisor"; as,

$$\frac{3}{4} \times \frac{3}{2} = \frac{9}{8} = 1\frac{1}{8}.$$

NOTE TO TEACHERS. This method may be applied to the explanation of examples in Division given above, if, in the judgment of the teacher, it is thought to be of value at this stage of advancement.

30. ORAL REVIEW.

1. The sum of two fractions is $\frac{3}{4}$, one of the fractions is $\frac{1}{3}$; what is the other?

2. If 10 oranges cost $\frac{5}{8}$ of a dollar, what will 1 orange cost?

3. How many badges, each $\frac{1}{16}$ of a yard in length, can I cut from $\frac{7}{8}$ of a yard of ribbon?

4. A man owning $\frac{5}{6}$ of a mill sells $\frac{2}{3}$ of his share; what part of the mill does he still own?

5. $\frac{5}{8}$ of a cord of wood was sold for \$4.50; what is that a cord?

6. $\frac{3}{7}$ of 42 is $\frac{2}{11}$ of what number?

7. To how many people can you give $5\frac{2}{3}$ barrels of flour, if you give $\frac{1}{3}$ of a barrel to each person?

8. I wish to put $4\frac{3}{4}$ pounds of candy into eighth-pound packages. How many packages can I make?

9. At $\$8\frac{1}{3}$ a yard, what will $\frac{3}{5}$ of a yard of velvet cost?

10. At $\frac{3}{5}$ of a dollar a yard, how many yards of cloth can be bought for $\$8\frac{1}{3}$?

11. If a jar holds $\frac{3}{4}$ of a gallon of fruit, how many jars will be required to hold 6 gallons?

12. If 3 pounds of coffee are sold for \$1, what part of 3 pounds should be sold for 25 cents? What part of one pound?

13. I sold a book for $\frac{2}{3}$ of a dollar, which is $\frac{1}{5}$ of a dollar less than it cost; what part of a dollar did the book cost?

14. 3 oranges are sold for a dime; what must I pay for $2\frac{1}{4}$ dozen?

15. If $\frac{5}{8}$ of a yard of ribbon cost 25 cents, what will $\frac{1}{4}$ of a yard cost?

16. How far is it round a field $\frac{1}{2}$ a mile long and $\frac{1}{5}$ of a mile wide?

17. $\frac{7}{8}$ of a quire of paper made one note-book; how many quires will be used in making 40 such books?

18. Robert sold his sled for $\$1\frac{1}{5}$, losing $\frac{1}{2}$ the cost; what did the sled cost?

19. A cake of ice $\frac{3}{4}$ of a foot thick floats $\frac{1}{8}$ above the water; what part of a foot is below the surface? How many inches?

20. A boy bought $\frac{3}{4}$ of a bushel of chestnuts for $\$2$, and sold them for 10 cents a quart; how much did he gain?

21. Take $\frac{1}{20}$ of a dollar from $\frac{4}{5}$ of a dollar, and with the remainder buy oranges at $\frac{3}{5}$ of a dollar a dozen. How many dozen can you buy?

22. A man is 42 years old, and $\frac{1}{7}$ of his age is $\frac{1}{3}$ of the age of his son. How old is his son?

23. Bananas sell at the rate of $\frac{5}{6}$ of a dozen for $\frac{1}{5}$ of a dollar. At that rate, what will 60 bananas cost?

24. 3 times $\frac{1}{2}$ of $\frac{2}{3}$ is how many times $\frac{2}{5}$?

25. $2\frac{1}{2} \times 5\frac{1}{3} = ?$ $3\frac{1}{3} \times 6\frac{1}{2} = ?$ $6\frac{1}{8} - 5\frac{1}{4} = ?$

26. The difference between two fractions is $\frac{5}{12}$. One of the fractions is $\frac{1}{3}$; what is the other?

27. What will $10\frac{1}{2}$ pounds of sugar cost at $6\frac{1}{2}$ cents a pound?

28. There are $16\frac{1}{2}$ feet in one rod. How many feet are there in 5 rods?

29. If shoes which cost $\$3\frac{3}{4}$ a pair are sold at $\frac{5}{6}$ of the cost, how many pairs can I get for \$25?

30. Horace earns $\$1\frac{1}{2}$ a day. In how many days, at that rate, can he earn \$50?

31. MISCELLANEOUS PROBLEMS.

1. In three pieces of carpeting that contain $44\frac{3}{4}$ yards, $39\frac{3}{8}$ yards, and $53\frac{1}{3}$ yards, how many yards?

2. A farmer sold two loads of hay, one for $\$15\frac{3}{4}$ and the other for $\$18\frac{3}{5}$, and received \$29 down; how much is still due?

3. Paid $\$365\frac{7}{8}$ for a horse, and sold him for $\frac{4}{5}$ of what he cost; what was the loss?

4. Divide $\frac{7}{12}$ of $2\frac{5}{8}$ by $\frac{5}{8}$ of $8\frac{3}{4}$.

5. If a man travel 680 miles in $8\frac{3}{4}$ days, how far would he travel in $5\frac{1}{2}$ days?

6. A miner digs $16\frac{1}{8}$, $21\frac{3}{16}$, and $18\frac{1}{3}$ ounces of gold. He loses $3\frac{3}{8}$ ounces in washing. How much gold has he left?

7. I earned $\$13\frac{3}{5}$ one week, $\$15\frac{3}{9}$ the next week, $\$11\frac{2}{3}$ the next, and $\$18\frac{1}{5}$ the next; how much did I earn in the four weeks?

8. I sold a horse for $\$185\frac{3}{7}$, and thereby lost $\$9\frac{5}{9}$. How much did the horse cost?

9. Bought 47 yards of cloth; kept $8\frac{3}{8}$ yards, and sold the remainder at $\$3\frac{1}{3}$ a yard. What did I get for it?

10. From 240 acres of land, $43\frac{2}{5}$ acres are sold to one man, and $\frac{1}{3}$ of the remainder to another. How many acres remain unsold?

11. An Illinois farmer had three wheat fields; the first produced $219\frac{4}{5}$ bushels, the second $407\frac{3}{9}$ bushels, the third $328\frac{1}{8}$ bushels. He sent $458\frac{3}{5}$ bushels to a flour mill, and sold 189 bushels. How many bushels were left?

12. If $\frac{5}{9}$ of a mill is worth \$6335, what is three-fourths of the remainder worth?

13. A person spending $\frac{1}{8}$, $\frac{2}{5}$, and $\frac{1}{4}$ of his money had \$783 left; how much had he at first?

14. If $9\frac{1}{2}$ tons of hay cost \$95, how many tons can be bought for \$108?

15. If $18\frac{2}{3}$ dozen eggs cost $\$4\frac{12}{25}$, how much will $13\frac{3}{4}$ dozen cost?

16. How many pounds of butter at $16\frac{2}{3}$ cents a pound will pay for $24\frac{2}{3}$ pounds of sugar at $6\frac{1}{4}$ cents a pound?

17. $1\frac{1}{4} \div 2\frac{2}{5} \times 8\frac{16}{25} = ?$

18. Multiply $1\frac{1}{2} \div 2\frac{1}{3}$ by $\frac{3}{7} \div 4\frac{1}{2}$.

19. Find the value of $\frac{3}{8} \times 2\frac{5}{7} \div (1\frac{6}{7} - \frac{3}{4})$.

20. What is the value of $\frac{2}{3} \times 1\frac{1}{12} \div \frac{1}{18} \times 5\frac{1}{2}$?

21. How many weeks will it take to spend \$182, if my weekly expenses are $\$22\frac{3}{4}$? If my income is $\$37\frac{1}{2}$ a week, how much do I save in that time?

22. Bought a half interest in a grocery for \$1100. At the end of the year sold $\frac{1}{3}$ of my interest for \$500. What part of the business do I still own? What is the entire grocery, or business, worth at that rate?

23. The income from my Iowa farm this year is \$4500. One ninth of this amount equals four times my income from my orchard. What is the income from the latter? How many times as great is the income from the farm?

24. Mr. Jones is 48 years old. The ages of his wife and children expressed in parts of his age are as follows: wife's, $1\frac{1}{12}$ of his age; John's, $\frac{3}{8}$; Mary's, $\frac{5}{16}$; Susan's, $\frac{1}{4}$; and Robert's, $\frac{1}{8}$. What is the age of each? What is the sum of their ages?

CHAPTER V.

1. DECIMAL FRACTIONS.

Draw a line upon the board ten feet long; divide it into ten equal parts. Each part is called what?

Divide each tenth into ten equal parts. One tenth of one tenth is what part of the whole?

One tenth of one hundredth is what part of the whole?

One tenth of one thousandth is what part of the whole?

How many thousandths make one hundredth?

How many hundredths make one tenth?

These tenth parts are called *decimal* parts.

A dime is a decimal part of a dollar; a cent is a decimal part of a dime.

2. A *decimal fraction* is one or more of the decimal parts of a unit. The denominator is *ten*, or some power of ten.

3. In common fractions both terms are *written*, while in decimal fractions the denominator is indicated by the position of the right hand figure of the numerator with respect to the decimal point.

4. The *decimal point* is a period placed at the left of the order of tenths to indicate the decimal orders.

Beginning with the decimal point, the first place to the right is *tenths;* the second place, *hundredths;* the third place, *thousandths;* etc. The fraction $\frac{2}{10}$ is written .2; the fraction $\frac{2}{100}$ is written .02.

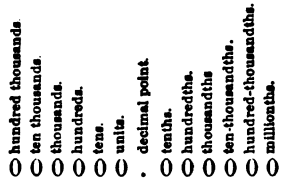
2	units.
.2	tenths.
.02	hundredths.
.002	thousandths.
.0002	ten-thousandths.
.00002	hundred-thousandths.
.000002	millionths.

5. In reading decimals, read the numbers as if they were integers (which gives the numerator), and give the decimal order of the last figure (which gives the denominator). 4 tenths and 5 hundredths equal 45 hundredths (.45). 4 hundredths and 5 thousandths equal 45 thousandths (.045).

It is best to pronounce the word "*and*" at the decimal point, and omit it in all other places in reading numbers. 200.024 is read, two hundred *and* twenty-four thousandths.

6. A mixed decimal is an integer and a decimal written together as one number; as, 5.02.

7. The decimal orders decrease in value from left to right, and increase from right to left, in the same manner as integral numbers.



Write the decimal point and ciphers as given above.

Write below, 2 in tenths' place, 2 in tens' place, 0 in units' place, and read the number.

Write 6 in hundreds' place, in units' place, and in hundredths' place, fill tens' and tenths' places with ciphers, and read the number.

8. Read the following decimals:

.5	.06	.145	3.45	.700
.05	.60	.265	4.89	4.900
.15	.56	.103	5.07	4.009
.30	.84	.047	7.008	6.800
.45	.96	.006	9.037	6.080

9. Express the following in decimal form:

$\frac{6}{10}$, $\frac{4}{10}$, $\frac{35}{100}$, $\frac{75}{100}$, $\frac{230}{1000}$, $\frac{350}{1000}$, $6\frac{8}{10}$, $25\frac{4}{100}$, $36\frac{4}{1000}$.

6 hundredths. 19 hundredths. 60 thousandths.
25 hundredths. 40 thousandths. 9 and 7 tenths.
301 thousandths. 97 hundredths. 6 and 7 hundredths.

10. Read the following:

.507	.0030	.5056	.000045
.0507	.00300	.05056	.000450
.0336	.03000	.03284	.004500

11. Express decimally:

8 ten-thousandths.
769 ten-thousandths.
4004 hundred-thousandths.
47 millionths.
3003 hundred-thousandths.
2364 ten-thousandths.
3 thousand and 3 thousandths.
3 thousand and 30 thousandths.
3 thousand and 300 thousandths.
Seventeen and seventeen thousandths.
One hundred thousand and one hundred-thousandths.

$\frac{65}{100}$, $\frac{17}{1000}$, $\frac{415}{10000}$, $\frac{3450}{100000}$, $\frac{3450}{1000000}$, $\frac{80}{10000000}$, $\frac{10001}{100000}$, $\frac{67}{10000}$, $\frac{60006}{100000}$, $\frac{100001}{1000000}$.

12. Since decimal orders are fixed by the decimal point, annexing ciphers to a decimal does not change its value; it is multiplying both terms of the fraction by the same number.

$$.6 = .60 \quad (\tfrac{6}{10} = \tfrac{60}{100}).$$

Change 2 hundredths to thousandths.

Reduce .65 to thousandths; 95 to ten-thousandths.

Change .450 to ten-thousandths; 450 to millionths.

Removing ciphers from the right of a decimal does not change its value.

Reduce .3000 to hundredths; .3000 to tenths.

Change .16000 to hundredths; 4.6000 to hundredths.

13. Changing decimals to common fractions.

Change .96 to a common fraction of equivalent value.

$$.96 = \tfrac{96}{100} = \tfrac{24}{25}.$$

Write the denominator under the decimal, omit the decimal point, and change the fraction to its lowest terms.

Change to equivalent common fractions or mixed numbers:

1. .9	6. .275	11. .0125	16. .0096
2. .09	7. .0275	12. 5.36	17. 90.0090
3. .35	8. .045	13. 15.036	18. 60.1600
4. .15	9. .009	14. 18.005	19. 19.2576
5. .015	10. .508	15. 16.16	20. 180.0008

14. Changing common fractions to decimals.

Change $\frac{3}{4}$ to an equivalent decimal.

$\frac{3}{4} = \frac{300}{400}$, reduced to hundredths, $\frac{300}{400} \div \frac{4}{4} = \frac{75}{100}$, which expressed decimally is .75.

The same result is obtained by annexing ciphers to the numerator, dividing by the denominator, and pointing off as many decimal places in the quotient as there are ciphers annexed.

$$4\,)\,3.00$$
$$.75$$

Change $\frac{5}{6}$ to an equivalent decimal.

$$6\,)\,5.000 \qquad \text{or,} \quad 6\,)\,5.000$$
$$.833\tfrac{1}{3} \qquad\qquad .833+$$

If, after annexing ciphers, the numerator is not exactly divisible by the denominator, the decimal may be completed by writing the remainder as a common fraction, or the sign + may be added to show that the division is not completed.

Change to equivalent decimals:

1. $\frac{3}{4}$, 3. $\frac{1}{4}$, 5. $\frac{4}{5}$, 7. $\frac{1}{16}$, 9. $\frac{13}{50}$, 11. $\frac{45}{100}$, 13. $\frac{2}{5}$, 15. $12\frac{7}{25}$, 17. $16\frac{3}{4}$,
2. $30\frac{3}{4}$, 4. $62\frac{1}{2}$, 6. $\frac{3}{40}$, 8. $\frac{7}{8}$, 10. $\frac{7}{15}$, 12. $33\frac{1}{8}$, 14. $\frac{8}{125}$, 16. $\frac{5}{12}$, 18. $\frac{7}{111}$.

15. ADDITION OF DECIMALS.

What is the sum of 5 tenths and 3 tenths? 8 tenths and 9 tenths?

8 tenths + 9 tenths = 17 tenths = 1.7.

Find the sum of 25.4, 120.7, 216.009, and .496.

25.4
120.7
216.009
.496
362.605

Write the numbers so that units of the same order stand in the same column. Begin at the right and add as in addition of integers. Place the decimal point at the left of the tenths' order in the amount.

Find the sum of:

(1) .680, .729, .006, .3, .40, and .400.

(2) 65.789, 36.908, 45.8, and 3001.601.

(3) 8.675, 34.6004, .0007, .89070, and 189.3.

(4) 1009.09, 3040.60, 10001.345, .0009, and 987.

(5) 62.5 yards + 95.7 yards + 67.25 yards + 9.48 yards.

(6) 9 and 101 thousandths, 7 and 3 tenths, 15 and 75 hundredths, 38 and 25 thousandths.

(7) One hundred eleven thousandths, two hundred twenty-five ten-thousandths, sixteen millionths, one hundred five and one hundred five ten-thousandths, three hundred fifty and three hundred fifty millionths.

16. SUBTRACTION OF DECIMALS.

From 45.75 take 26.9.

45.75
26.9
18.85

Write the subtrahend under the minuend, so that units of the same order shall stand in the same column, and subtract as in the subtraction of integers.

From 64.7 take 19.013.

64.700
19.013

If there are more decimal places in the subtrahend than in the minuend, fill the vacant orders of the minuend with ciphers.

Find the difference between:

(1) 303.48 and 199.09.
(2) 87.076 and 65.0005.
(3) 1005.15 and 105.0150.
(4) .8 and .08.
(5) 9 tenths and 9 ten-thousandths.
(6) 101.009 and 81.998.
(7) 1616.1616 and 987.90.
(8) 7 hundredths and 7 millionths.
(9) 90 hundredths and 90 thousandths.
(10) From the sum of 48.12 and 95.19 take 60.2.
(11) From the sum of 96.009 and 84.325 take 75.0016.

17. MULTIPLICATION OF DECIMALS.

Two times 8 tenths are how many tenths?

2 times .8 = 16 tenths = 1.6.

3 times 9 tenths are how many tenths?

$\frac{3}{10} \times \frac{3}{10} = ?$ $\frac{3}{10} \times \frac{3}{100} = ?$ $\frac{5}{100} \times \frac{8}{100} = ?$

Express the answers decimally.

What is the product when tenths are multiplied by tenths? Hundredths by hundredths? Tenths by hundredths? Hundredths by thousandths?

Multiply $\frac{6}{10}$ by $\frac{4}{100}$. Multiply $\frac{5}{100}$ by $\frac{5}{1000}$.

Express answers decimally.

$\frac{424}{1000} \times \frac{6}{10} = \frac{2544}{10000}$.

.424
.6
.2544

The product of thousandths by tenths is ten-thousandths. The product contains as many decimal places as there are in both factors.

18. Multiply .253 by .35.

.253	***Multiply as in whole numbers, and point off as many decimal places in the product as there are in both multiplicand and multiplier. If there are not enough figures in the product to fill the decimal places, prefix as many ciphers as are necessary to make the required number.***
.35	
1265	
759	
.08855	

Multiply:

(1) .386 by .47	(5) 49.3 by .064	(9) 376 by 3.06
(2) .231 by .36	(6) 492 by 3.8	(10) 376 by 30.6
(3) 48.2 by 25	(7) 384.45 by .64	(11) .009 by .009.
(4) 48.2 by .25	(8) 38.445 by .64	(12) .096 by .75.

19. DIVISION OF DECIMALS.

What is the quotient of 8 tenths divided by 4? Of 8 tenths divided by 4 tenths?

How many times are 3 hundredths contained in 9 hundredths? 3 thousandths in 9 thousandths?

What is the quotient of $\frac{6}{10} \div 2$? $.6 \div 2 = ?$

What is the quotient of $\frac{6}{10} \div \frac{2}{10}$? $.6 \div .2 = ?$

What is the product of $.7 \times .7$? $.49 \div .7 = ?$

What is the product of $.08 \times .08$? $.0064 \div .08 = ?$

$2.6 \times 4 = ?$ $\quad 10.4 \div 4 = ?$ $\quad 10.4 \div 2.6 = ?$

The dividend is the product of the divisor by the quotient. The quotient contains as many decimal places as the number of decimal places in the dividend exceeds the number in the divisor.

20. Divide 16.048 by 3.4. Divide 9.5 by .25.

$$
\begin{array}{r|l}
3.4 & 16.048 \\
 & 13\,6 \\
\hline
 & 2\,44 \\
 & 2\,38 \\
\hline
 & 68 \\
 & 68 \\
\hline
\end{array}
\qquad 4.72
$$

$$
\begin{array}{r|l}
.25 & 9.50 \\
 & 7\,5 \\
\hline
 & 2\,00 \\
 & 2\,00 \\
\hline
\end{array}
\qquad 38
$$

$9.5 = 950$ hundredths $\div$ 25 hundredths $= 38$, an integral number.

Divide as in the division of integers, and point off as many decimal places in the quotient as the number of decimal places in the dividend exceeds the number in the divisor.

NOTE 1. When the dividend has fewer decimal places than the divisor, annex ciphers to the dividend.

2. When the quotient has not enough decimal figures, prefix ciphers.

3. When there is a remainder, the division may be continued by annexing ciphers to the dividend.

21. Divide:

(1) 34.5 by .15
(2) 34.5 by .015
(3) 5.5 by 1.25
(4) 5.5 by .0125
(5) 450.5 by 1.75
(6) 48.6 by .02
(7) 48.6 by 2
(8) 765 by .765
(9) 5.53 by .0642
(10) 2 by .0002
(11) .0456 by 9.8
(12) .0656 by .042
(13) 65.65 by .002
(14) 450.5 by .0175
(15) 86.075 by 25.5

22. MISCELLANEOUS PROBLEMS.

1. The subtrahend is eight thousand and forty-eight ten-thousandths, and the remainder is eight hundred seventy-three hundred-thousandths; what is the minuend?

2. There are 228.35 barrels of water in a cistern which will hold 410.5 barrels; how many barrels will be needed to fill the cistern?

3. At .085 of a dollar per dozen, what will $10\frac{3}{4}$ dozen steel pens cost?

4. From a barrel containing 43 gallons of vinegar, .125 gallons were drawn at one time, 3.5 at another, and .75 at another; how many gallons remained in the barrel?

5. Dry goods valued at $8000 were destroyed by fire; what would a man lose who owned .12 of the goods?

6. A gallon, liquid measure, contains 231 cubic inches; how many gallons in 13051.5 cubic inches?

7. At $6.80 an acre, how many acres of land can be bought for $4258?

8. Bought 17 chests of tea, each containing 59 pounds, at $0.67 a pound, and gave in exchange 118 bags of wheat, each containing 3.4 bushels; what was the value of the wheat per bushel?

9. When the dividend is .1 and the divisor 12.8, what is the quotient?

10. What is the quotient of 312.5 divided by 85?

11. If 38 yards of cloth cost $180.50, what will be the cost of 26 yards?

12. At $2.56 per yard, how many yards of cloth can be bought for $98.4?

13. A farmer sold to a merchant 3 loads of hay, each weighing 1876 pounds, at \$16.50 per ton (2000 pounds), and $33\frac{3}{4}$ bushels of oats at \$0.75 per bushel. He received in payment 32 yards of carpet at \$0.85 per yard, and $23\frac{1}{2}$ yards of matting at \$0.65 per yard, and the remainder in money; how much money did he receive?

14. A druggist sold 375 gallons of ink in bottles holding .375 of a gallon each; how many bottles of ink did he sell?

15. By selling a carriage for \$195 I lost \$34.50. For how much should I have sold it to gain an amount equal to .7 of what I lost?

23. UNITED STATES MONEY.

United States money is the legal currency of the United States. Its denominations are *dollars*, *dimes*, *cents*, and *mills*.

United States money is based upon the decimal system, — each denomination is a decimal part of a higher denomination.

10 mills (m.) = 1 cent.
10 cents = 1 dime.
10 dimes = 1 dollar.

Coin is the metallic currency of the country. Bank notes and United States treasury notes and certificates are the paper currency.

The principal *gold* coins are the double-eagle ($20), the eagle ($10), the half-eagle ($5), the quarter-eagle ($2½), the three-dollar piece, and the dollar.

The *silver* coins, 5-cent, 10-cent, 25-cent, 50-cent, and $1 pieces.

The *nickel* coins, 3-cent and 5-cent pieces.

The *bronze* coins, 1-cent and 2-cent pieces.

There is no coin known as the *mill.* That denomination is used only in making calculations.

24. The rules which apply to calculations involving integers and decimals apply also to calculations involving United States money.

Dollars and cents are separated by the decimal point. The two figures at the right of dollars express *cents,* and the third figure expresses *mills.*

Read the following:

$4.605	$3.078	$8.707	$0.005
$4.065	$7.077	$7.007	$0.095

25. Express in figures:

1. Twenty-five dollars five mills.
2. Nine dollars one cent one mill.
3. Seventeen dollars seventeen cents.
4. Seven dollars one cent seven mills.
5. Twelve dollars seven and a half cents.
6. One hundred eleven dollars one cent one mill.
7. One thousand one dollars one mill.
8. Two thousand dollars two and a half cents.

26. Reduce $18.00 to cents.

One dollar equals one hundred cents.
$18 = 18 times 100 cents = 1800 cents.

To reduce dollars to cents:

Annex two ciphers and remove the dollar sign.

Reduce $18.75 to cents.

$18 = 1800 cents. 1800 + 75 cents = 1875 cents.

To reduce dollars and cents to cents:

Remove the decimal point and the dollar sign.

Reduce to cents: $29; $72.75; $30.16; $200.02.

Reduce 80 cents to mills.

1 cent equals 10 mills. 80 cents = 80 times 10 mills = 800 mills.

To reduce cents to mills:

Annex one cipher.

Reduce $9 to mills.

One dollar = 1000 mills. $9 = 9 times 1000 mills = 9000 mills.

To reduce dollars to mills:

Annex three ciphers and remove the dollar sign.

To reduce dollars, cents, and mills to mills:

Remove the decimal point and the dollar sign.

Reduce the following to mills:

1. $34	5. $24.655	9. $18.964	13. $13.145
2. $25.25	6. $9.12½	10. $0.75	14. $0.755
3. $0.535	7. $0.672	11. $0.37½	15. $8.62½
4. $0.98⅜	8. $100.75	12. $1000.62	16. $46.024

27. Reduce 1800 cents to dollars.

One dollar equals 100 cents. In 1800 cents there are as many dollars as there are 100 cents in 1800 cents, or \$18.

To reduce cents to dollars:

Divide by one hundred, by placing the decimal point before the second figure from the right.

To reduce mills to dollars:

Divide by one thousand, by placing the decimal point before the third figure from the right.

Reduce to dollars:

1. 1200 cents; 2. 12000 cents; 3. 29018 cents; 4. 160 cents; 5. 1200 mills; 6. 2500 mills; 7. 25000 mills.

28. ADDITION AND SUBTRACTION.

To add or subtract United States money:

Write units of the same order in the same column, and add or subtract as in simple numbers. Separate dollars and cents by the decimal point.

1. What is the sum of \$34, \$15.85, \$6.875, \$0.95, and \$0.62½?

2. Find the sum of \$11.93, \$119, \$4007.62, and \$30.09.

3. From \$62.40 take \$7.37½. (\$7.37½ = \$7.375.)

4. From \$892.46 take \$495.78.

5. From \$500.63 take \$199.73.

29. MULTIPLICATION AND DIVISION.

What will 50 bushels of wheat cost at $\$1.62\frac{1}{2}$ a bushel?

$$\begin{array}{r} \$1.625 \\ 50 \\ \hline \$81.250 \end{array}$$

At $\$0.12\frac{1}{2}$ a box, how many boxes of pens can be bought for $\$6.00$?

$$\begin{array}{l} \$0.125 \,)\, \$6.000 \,(\, 48 \text{ (times).} \\ \quad 5\,00 \\ \quad \overline{1\,000} \qquad \textit{Ans.}\ 48 \text{ boxes.} \\ \quad 1\,000 \\ \quad \overline{} \end{array}$$

When the dividend has fewer decimal places than the divisor, annex ciphers to the dividend.

If 7 barrels of cider can be bought for $\$35.87\frac{1}{2}$, what is the cost of one barrel?

$$\begin{array}{l} 7 \,)\, \$35.875 \\ \quad \overline{\$5.125} \quad \textit{Ans.} \end{array}$$

To multiply or divide sums of money:

Multiply or divide as in integers and decimals. Separate dollars and cents in the result by the decimal point.

30. MISCELLANEOUS PROBLEMS.

1. From the sum of $\$15.75$ and $\$1001.10$ take the sum of $\$101.018$ and $\$50.101$.

2. Subtract $\$0.50$ from $\$1.005$.

3. A man bought a coat for $16, a vest for $3.50, and a pair of trousers for $5.50; what two coins will exactly pay for them?

4. From the sum of $14.50 and $12.75 take 6 dimes 6 mills.

5. From $4.50 take 37½ cents.

6. A grocer bought 3 barrels of apples for $6.75, a box of lemons for $2.50, and 5 barrels of flour for $30.00. He handed the merchant two gold pieces, and received $0.75 in change. What were the two pieces of money?

7. At $0.12½ a yard, how much muslin can be bought for $20.43?

8. If ¾ of a yard of cloth cost $2.16, what will be the cost of 5½ pieces, each containing 447 yards?

9. When rice is selling at $.075 a pound, how many pounds can be bought for $5.25?

10. How many days, of 9 hours each, must a man work in order to earn $576.72, at 18 cents an hour?

11. If a lady earns $15.00 a week, and spends an average amount of $11.37½, in how many weeks will she save $166.75?

12. 31.5 gallons of vinegar cost $11.81¼; how much is that per gallon?

BILLS.

13. Thomas Wilson bought of James Mitchell & Son, St. Louis, Mo., Sept. 8, 1890, 18 yards of flannel, at 36 cents; 15 yards of muslin, at 23 cents; 3 dozen silk buttons, at 42 cents; 18 yards of sheeting at 16½ cents; 2 boys' suits, at $8.50 and $13; 3 silk ties, at 85 cents; 1 cloak, $16.50; ½ dozen handkerchiefs, at 18 cents each; 13 yards of velvet, at $2.75. Make out and receipt this bill as clerk of James Mitchell & Son.

14. John Clark bought of Charles Andrews, Detroit, Mich., Aug. 12, 1890, 13 yards of silk, at $2.95; 6 pairs of kid gloves, at $1.49; 33½ yards of drilling, at 18 cents; 19 yards of ribbon, at 36 cents; 1 dozen linen napkins, at $3.75; 1 overcoat, $23.75; 1 umbrella, $3.75; 19½ yards of cambric, at 14 cents; 6½ yards of embroidery, at 48 cents. Make out and receipt this bill.

15. James Goodman bought of C. H. Slack & Co., Chicago, Ill., April 19, 1893, 5 barrels of flour, at $7.50; 2 barrels of brown sugar, 270 pounds each, at 4 cents; 1 barrel of granulated sugar, 225 pounds, at 6 cents; 1 sack of coffee, 60 pounds, at 22½ cents; 2 boxes of raisins, each 18 pounds, at 9 cents; 1 chest of tea, 37 pounds, at 37½ cents. Make out and receipt this bill.

CHAPTER VI.

COMPOUND NUMBERS.

1. A *Simple Quantity* is expressed in units of one denomination; as, 4 pecks.

A *Compound Quantity* is expressed in units of different denominations which are reducible to units of the same denomination; as, 4 pecks, 3 quarts.

2. A *Denominate Number* is a number composed of denominate units.

A *Simple Denominate Number* is composed of units of one denomination.

A *Compound Denominate Number* is composed of units of two or more denominations which are reducible to units of the same denomination.

3. *Reduction* is the process of changing the denomination of a number without changing its value. Changing denominate numbers to lower denominations is called *Reduction Descending*. Changing to higher denominations is called *Reduction Ascending*.

In reducing denominate numbers, the increase or decrease in the number of units is by an irregular scale, instead of by the decimal scale as in simple numbers.

DRY MEASURE.

4. *Dry Measure* is used in measuring grain, fruit, seeds, vegetables, and other dry articles.

The denominations are *pints*, *quarts*, *pecks*, and *bushels*.

2 pints (pt.) = 1 quart (qt.).
8 quarts = 1 peck (pk.).
4 pecks = 1 bushel (bu.).

1 bu. = 32 qt. = 64 pt.

The standard bushel is 18½ inches in diameter and 8 inches deep, and contains 2150.42 cubic inches.

1. How many bushels in 24 pecks? 25 pecks? 35 pecks?
2. Reduce 5 bushels to pecks. To quarts.
3. Reduce 2 pecks to pints. 2 bushels to pints.

5. Reduce 16 bu. 3 pk. 1 pt. to pints.

bu.	pk.	qt.	pt.
16	3	0	1
4			
67	pk.		
8			
536	qt.		
2			
1073	pt.		

One bushel = 4 pecks. In 16 bushels there are 4 times as many ones of pecks as ones of bushels. 16 multiplied by 4 = 64. There are 64 pecks in 16 bushels. 64 pecks + 3 pecks = 67 pecks.

One peck = 8 quarts. In 67 pecks there are 8 times as many quarts. 8 times 67 = 536. There are 536 quarts in 67 pecks.

One quart = 2 pints. In 536 quarts there are 2 times as many pints. 2 times 536 = 1072. 1072 pints + 1 pint = 1073 pints.

16 bushels, 3 pk. 1 pt. = 1073 pints. *Ans.*

1. Reduce 8 bu. 3 pk. 1 pt. to pints.
2. Reduce 15 bu. 3 pk. to quarts.
3. Reduce 12 bu. 1 pk. 3 qt. to pints.
4. Reduce 3 pk. 6 qt. to pints.

To reduce a compound denominate number to a lower denomination:

Multiply the highest denomination by the number of ones of the next lower which make one of the higher, and add to the product the given number of the same denomination.

Proceed in like manner with each successive result, until the number is reduced to the required denomination.

6. Reduce 689 pints to bushels.

2) 689 pt.
8) 344 qt. + 1 pt.
4) 43 pk.
10 bu. + 3 pk.

There are in 689 pints as many quarts as there are times 2 pints, which is 344, with 1 pint remaining undivided.

There are in 344 quarts as many pecks as there are times 8 quarts, which is 43.

There are in 43 pecks as many bushels as there are times 4 pecks, which is 10, with 3 pecks remaining.

689 pints = 10 bu. 3 pk. 1 pt.

1. Reduce 817 pints to bushels. 168 quarts to bushels.
2. Reduce 682 pints to bushels. 95 pints to pecks.
3. Reduce 125 quarts to bushels. 87 pints to pecks.

To reduce a compound denominate number to a higher denomination:

Divide the given number by the number of ones that make one of the next higher denomination.

Divide this quotient and each successive quotient in like manner, until the required denomination is reached.

The last quotient, with the several remainders annexed, in proper order, is the result required.

LIQUID MEASURE.

7. *Liquid Measure* is used in measuring liquids. The denominations are *gills*, *pints*, *quarts*, and *gallons*.

4 gills (gi.) = 1 pint (pt.).
2 pints = 1 quart (qt.).
4 quarts = 1 gallon (gal.).

The gallon contains 231 cubic inches. $1\frac{1}{6}$ pints liquid measure equal 1 pint dry measure.

The barrel contains $31\frac{1}{2}$ gallons; the hogshead 63 gallons.

1. Reduce 15 gallons to pints. Reduce 18 gallons to gills.

2. Reduce 17 gal. 1 qt. 1 pt. 3 gi. to gills. Reduce 8 quarts to gills.

3. How many gallons in 47 quarts? How many gallons in 47 pints?

4. Reduce 86 gills to quarts. 98 gills to gallons.

5. Reduce 25 gal. 1 pt. to gills. Reduce 19 gallons to pints.

AVOIRDUPOIS WEIGHT.

8. *Avoirdupois Weight* is used in weighing all articles except *gold, silver,* and *precious stones.* The denominations are *ounces, pounds, hundred-weights,* and *tons.*

16 ounces (oz.)			= 1 pound (lb.).
100 pounds			= 1 hundred-weight (cwt.).
20 hundred-weight, 2000 lb.			= 1 ton (T.).
60	pounds of	wheat	= 1 bushel.
56	"	corn or rye	= 1 "
32	"	oats	= 1 "
100	"	nails	= 1 cask or keg.
196	"	flour	= 1 barrel.
200	"	beef or pork	= 1 barrel.

1. Reduce 3 tons to pounds. Reduce 6 hundred-weight to ounces.

2. Reduce 7 cwt. 48 lb. 9 oz. to ounces. Reduce 9 tons to ounces.

3. Reduce 54145 pounds to tons. Reduce 3684 ounces to pounds.

4. Reduce 36425 pounds to hundred-weights. Reduce 32000 ounces to tons.

5. Reduce 5 T. 12 cwt. 36 lb. to pounds.

TROY WEIGHT.

9. *Troy Weight* is used in weighing gold, silver, and jewels.

24 grains (gr.)	= 1 pennyweight (pwt.).
20 pennyweights	= 1 ounce (oz.).
12 ounces	= 1 pound (lb.).

10. MISCELLANEOUS PROBLEMS.

1. How many pint packages can a seedsman make from 4 bu. 2 pk. and 2 qt. of seeds?

2. What will $1\frac{1}{2}$ barrels of vinegar cost at 8 cents a quart?

3. In one season a market-gardener sold 12345 boxes of strawberries, averaging 1 quart each. How many bushels did he sell?

4. At 7 cents a pound, what will $2\frac{1}{2}$ barrels of pork cost?

5. If a horse eats 1 pk. 6 qt. of oats in a day, how long will 7 bu. 2 pk. last?

LONG MEASURE.

11. *Long* or *Linear Measure* is used in measuring lengths and distances.

The denominations are *inches, feet, yards, rods,* and *miles.*

12	inches (in.)	= 1 foot (ft.).
3	feet	= 1 yard (yd.).
$5\frac{1}{2}$	yards, or $16\frac{1}{2}$ feet	= 1 rod (rd.).
320	rods	= 1 mile (mi.).
1760	yards, or 5280 feet	= 1 mile.

1. Reduce 12 rods to feet. Reduce 15 rd. 3 yd. 2 ft. to feet.

2. Reduce 136 rd. 4 yd. to inches. Reduce 18 miles to rods.

3. Reduce 4 mi. 130 rd. to rods. Reduce 5 mi. 20 rd. to inches.

4. Change to lowest denominations: $2\frac{1}{2}$ miles; 16 rd. 25 ft.; 34 yd.; 16.8 rd. $32\frac{1}{2}$ yd. $18\frac{1}{2}$ ft.

5. Change to highest denominations: 16000 feet; 63360 inches; 3240 rd.; 7040 yd.; 47520 ft.

6. Measure one side of your school lot and give the length in rods.

7. How many rods in $\frac{3}{4}$ of a mile?

8. 40 rods is what part of a mile?

9. If the large wheel of a bicycle is 15 feet in circumference, how many times will it turn in going 5 mi. 182 rd. 4 yd?

10. In a bundle of lath there are 100 pieces each 4 feet long. If all the pieces of the 4 bundles were laid end to end, what would be the length in rods?

11. From A to B is 17 rods. How many feet in one third that distance?

12. How long will it take George to walk a half-mile, if he walks at the rate of 20 rods a minute?

SQUARE MEASURE.

12. *Square Measure* is used in measuring surfaces, as of land, boards, plastering, etc.

The denominations are *square inches*, *square feet*, *square yards*, *square rods*, and *square miles*.

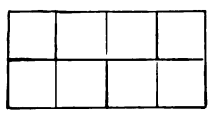
144	square inches (sq. in.)	= 1 square foot (sq. ft.).
9	square feet	= 1 square yard (sq. yd.).
$30\frac{1}{4}$	square yards	= 1 square rod (sq. rd.).
160	square rods	= 1 acre (A.).
640	acres	= 1 square mile (sq. mi.).

13. A surface has two dimensions, *length* and *breadth.*

A plane surface which has four square corners is called a *rectangle.*

A rectangle which has four equal sides is called a *square.*

The *area* of a surface is the number of square units it contains.



Suppose the top of a table to be 4 feet long and 2 feet wide. There are two rows of 4 square feet each; that is, 2 times 4 square feet or 8 square feet in the surface of the table. The width of one end shows how many times 4 square units must be taken to give the whole area.

To find the area of a rectangular surface, a certain number of square units are taken a given number of times.

What is the length of one side of a square yard?

Measure off in your schoolyard a square rod. What is the length of each side?

What is the area of a square that is $5\frac{1}{2}$ yards on each side?

To find the area of a rectangular surface:

The length and breadth being given in the same denomination, multiply the length by the breadth.

14. Reduce to lower denominations:

1. 140 square rods to square feet.
2. 18 acres t square rods.

3. 12 A. 50 sq. rd. 8 sq. yd. 1 sq. ft. to square feet.

4. 1 square mile to square inches.

5. 112 sq. rd. 5 sq. ft. to square feet.

Reduce to higher denominations:

6. 1440 square rods to acres; 4320 square rods to acres.

7. 23328 square inches to square yards.

8. 10890 square feet to square rods.

9. 102400 sq. rd. to square miles.

10. 5760 A. to square miles.

15. PROBLEMS.

1. How many square inches of surface has a pane of glass 3 feet long and 2 feet wide? (Make a drawing to show the number of rows of square feet; the number of rows of square inches.)

2. How many square inches in $\frac{3}{4}$ of a square foot? In $\frac{5}{6}$ of a square foot? (Drawing.)

3. How many square inches of surface in the top of a table which is 3 feet long and $2\frac{1}{2}$ feet wide?

4. Find the area of a floor which is 12 feet by 15 feet.

5. A floor has a surface of 180 square feet; if its length is 15 feet, what is its width?

6. How many acres in a field 18 rods long and 9 rods wide?

7. At $48 an acre, what will be the cost of a piece of land 160 rods long and 118 rods wide?

CUBIC MEASURE.

16. *Cubic Measure* is used in measuring solids. Its denominations are *cubic inches*, *cubic feet*, *cubic yards*, and *cords*.

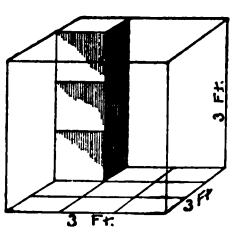
1728 cubic inches (cu. in.) = 1 cubic foot (cu. ft.).
27 cubic feet = 1 cubic yard (cu. yd.).
128 cubic feet = 1 cord (cd.).

In measuring wood, a pile 8 feet long, 4 feet wide, and 4 feet high is called a cord.

17. A cube is a solid bounded by six equal squares.

A cubic foot is a cube whose faces are each one foot square.

The solid contents of a body is the number of cubic units it contains.



The base of this cube is divided into square feet. There are 3 rows of 3 square feet each, making in all 3 times 3 square feet, which are 9 square feet.

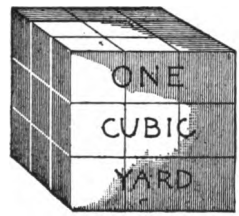
If upon each square foot we place 3 cubic feet, we shall have 9 times 3 cubic feet, which are 27 cubic feet.

A solid which is 3 feet long, 3 feet wide, and 3 feet high is a cubic yard, and contains 27 cubic feet.

How many cubic feet in $\frac{1}{3}$ of a cubic yard?

How many cubic feet in $\frac{1}{9}$ of a cubic yard?

How many cubic feet in $\frac{7}{9}$ of a cubic yard?



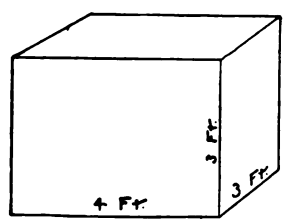
9 cu. ft. × 3 = 27 cu. ft.

To find the number of cubic units in any rectangular solid:

The length, breadth, and height being given in the same denomination, their product is the number of cubic units, of the same name as the linear units.

18. How many cubic feet of sand will be required to fill this box?

How many cubic feet in a layer of sand 1 foot high in this box?



How many cubic inches in one cubic foot? How many square inches of surface has one of the faces?

Build the cubic foot of 1-inch cubes.

These surface units are faces of what cubic units?

How many times must 144 cubic inches be taken to make one cubic foot?

19. PROBLEMS.

1. How many cubic inches in 1 cubic yard? In $\frac{1}{3}$ of a cubic yard? In $\frac{2}{3}$ of a cubic yard?

2. Reduce 12 cubic feet to cubic inches.

3. Reduce 87 cubic yards to cubic feet; $62\frac{1}{2}$ cubic yards to cubic feet.

4. Reduce 16 cords to cubic feet; $10\frac{1}{4}$ cords to cubic feet.

5. Reduce 20736 cubic inches to cubic feet.

6. Reduce 540 cubic feet to cubic yards.

7. Reduce 9 cu. yd. 7 cu. ft. to cubic inches.

8. Reduce 18 cu. yd. 12 cu. ft. 720 cu. in. to cubic inches.

9. Reduce 1152 cubic feet to cords; 6400 cubic feet to cords.

10. How many cubic feet in a rectangular block of stone 8 feet long, 5 feet wide, and 3 feet thick? (Make a drawing to show this.)

11. How many cubic feet in a pile of bricks 8 feet long, 4 feet wide, and 4 feet high?

12. A tank 6 feet long, 5 feet wide, and 3 feet deep contains how many cubic inches?

13. How many cubic feet of air in a room 18 feet long, 15 feet wide, and 10 feet high?

14. In digging a cellar 16 feet long, 12 feet wide, and 8 feet deep, how many cubic feet of earth must be removed?

15. How many cords in a pile of wood 16 feet long, 5 feet high, and 4 feet wide?

16. At $27 a cubic yard, what will it cost to dig a cellar 18 feet long, 14 feet wide, and 9 feet high?

17. How many cubic feet in a stick of timber 18 inches wide, 8 inches thick, and 12 feet long?

18. What is the value of a pile of wood 82 feet long, 4 feet wide, and 5 feet high, at $4.50 a cord?

TIME MEASURE.

20. *Time Measure* is used in measuring time.

The denominations are *seconds*, *minutes*, *hours*, *days*, *weeks*, *months*, *years*, and *centuries*.

60 seconds (sec.)	= 1 minute (min.).
60 minutes	= 1 hour (h.).
24 hours	= 1 day (d.).
7 days	= 1 week (wk.).
365 days	= 1 year (yr.).
366 days	= 1 leap year (l. yr.).
100 years	= 1 century (C.).

February has 28 days, except in leap year, when it has 29.

September, April, June, and November, each have 30 days; other months of the year (except February) each have 31 days.

In business transactions 12 months are considered a year and 30 days a month.

21. Reduce to lower denominations:

1. 12 hours to seconds; 5 days to minutes.

2. 8 d. 12 h. 40 min. to seconds.

3. How many minutes in the month of February, 1892 (l. yr.)?

Reduce to higher denominations:

4. 1440 minutes to days; 86400 seconds to days.

5. 52560 hours to years; 4743856 minutes to years.

22. MISCELLANEOUS MEASURES.

PAPER.		COUNTING.	
24 sheets	= 1 quire (qr.).	12 things	= 1 dozen (doz.).
20 quires	= 1 ream.	12 dozen	= 1 gross (gro.).
2 reams	= 1 bundle.	12 gross	= 1 great gross.
5 bundles	= 1 bale.		

ADDITION OF COMPOUND NUMBERS.

23. What is the sum of 4 gal. 3 qt. 1 pt., 6 gal. 1 qt., 7 gal. 2 qt. 1 pt.?

gal.	qt.	pt.
4	3	1
6	1	0
7	2	1
18	3	0

Write like denominations in the same column, and begin with the lowest denomination to add.

1 pint and 1 pint are 2 pints, equal to 1 quart, which we add with the column of quarts, writing 0 under the column of pints.

1 quart, 2 quarts, 1 quart, and 3 quarts are 7 quarts, which are equal to 1 gallon, 3 quarts. We write three under the column of quarts, and add the 1 gallon with the column of gallons.

1 gallon, 7 gallons, 6 gallons, and 4 gallons are 18 gallons, which we write under the column of gallons

1. Add 14 bu. 2 pk. 5 qt. 1 pt., 12 bu. 1 pk. 4 qt., 30 bu. 3 pk. 1 pt., and 18 bu. 2 qt.

2. What is the sum of 18 mi. 316 rd. 4 yd. 2 ft. 11 in., 29 mi. 112 rd. 5 yd. 1 ft. 5 in., 19 mi. 142 rd. 8 in., and 9 mi. 16 rd. 3 yd. 1 ft.?

3. Add 14 w. 9 d. 11 h. 34 min. 34 sec., 8 w. 8 d. 16 h., 11 w. 30 h. 40 min., 17 d. 21 h. 45 min. 16 sec., and 2 w. 3 d. 3 h. 25 min.

4. What is the sum of 12 gal. 3 qt. 1 pt. 3 gi., 13 gal. 1 pt. 2 gi., 25 gal. 2 qt., and 18 gal. 1 pt. 3 gi.?

SUBTRACTION OF COMPOUND NUMBERS.

24. From 28 rd. 5 yd. 1 ft. take 9 rd. 3 yd. 2 ft.

rd.	yd.	ft.
28	5	1
9	3	2
19	1	2

Write like denominations in the same column and begin with the lowest to subtract. 2 feet cannot be taken from 1 foot. Take 1 yard from 5 yards, reduce it to feet, and add it to 1 foot. 2 feet from 4 feet leaves 2 feet. 3 yards from 4 yards leaves 1 yard. 9 rods from 28 rods leaves 19 rods.

1. From 38 gal. 3 qt. 1 pt. 2 gi. take 27 gal. 3 qt. 3 gi.

2. From 53 cwt. 63 lb. 9 oz. take 33 cwt. 64 lb. 14 oz.

3. From 18 w. 1 d. 8 h. 45 min. take 7 w. 5 d. 12 h. 36 min.

4. What is the difference in time between Dec. 25, 1876, and Oct. 12, 1892?

yr.	mo.	d.
1892	10	12
1876	12	25
15	9	17

Write the earlier date (1876, 12th month, 25th day) under the later (1892, 10th month, 12th day) and subtract, allowing 30 days to a month and 12 months to a year.

5. What is the difference in time between July 4, 1876, and Jan. 1, 1892?

MULTIPLICATION OF COMPOUND NUMBERS.

25. Multiply 120 mi. 90 rd. 2 ft. 7 in. by 5.

mi.	rd.	yd.	ft.	in.
120	90	0	2	7
				5
601	130	4	0	11

Five times 7 inches are 35 inches, equal to 2 feet and 11 inches. Write 11 in the place of inches, and add 2 feet to the product of feet.

5 times 2 feet are 10 feet, and 2 feet added are 12 feet. 12 feet equal 4 yards. Write 0 in the place of feet, and add 4 yards to the product of yards.

The product of 0 yards multiplied by 5 is 0. Write 4 in the place of yards.

5 times 90 rods are 450 rods, equal to 1 mile and 130 rods. Write 130 in the place of rods, and add 1 mile to the product of miles.

5 times 120 miles are 600 miles, and 1 mile added are 601 miles.

Multiply:

1. 50 mi. 30 rd. 4 yd. 7 in. by 9.
2. 5 gal. 3 qt. 2 gi. by 12.
3. 6 T. 3 cwt. 14 lb. 9 oz. by 8.

4. 18 cu. yd. 16 cu. ft. 9 cu. in. by 7.

5. 16 sq. yd. 7 sq. ft. 86 sq. in. by 5.

6. 9 yr. 7 mo. 15 d. by 6.

7. How much wheat in a load of 18 sacks, each containing 3 bu. 1 pk.?

8. What is the area of 3 pieces of land, each containing 36 A. 120 sq. rd.?

9. Henry is 9 yr. 6 mo. 15 d. old. This is one-fourth of his father's age; how old is his father?

DIVISION OF COMPOUND NUMBERS.

26. Divide 21 w. 5 d. 14 h. 9 min. by 6.

	w.	d.	h.	min.
6)	21	5	14	9
	3	4	10	21½

$\frac{1}{6}$ of 21 weeks is 3 weeks and 3 weeks remaining. 3 w. = 21 d. 21 d. + 5 d. = 26 d. $\frac{1}{6}$ of 26 d. = 4 d. and 2 d. remaining. 2 d. = 48 h. 48 h. + 14 h. = 62 h. $\frac{1}{6}$ of 62 h. = 10 h. and 2 h. remaining. 2 h. = 120 min. 120 min. + 9 min. = 129 min. $\frac{1}{6}$ of 129 min. = 21½ min.

Divide:

1. 50 bu. 3 pk. 7 qt. by 6.
2. 25 gal. 3 qt. 1 pt. by 5.
3. 14 cwt. 60 lb. 8 oz. by 8.
4. 18 h. 25 min. 28 sec. by 4.
5. 20 cu. yd. 20 cu. ft. 9 cu. in. by 7.
6. 28 sq. yd. 7 sq. ft. 120 sq. in. by 9.
7. If a man dig a ditch 34 rd. 3 yd. 2 ft. long in 6 days, what length can he dig in 1 day?

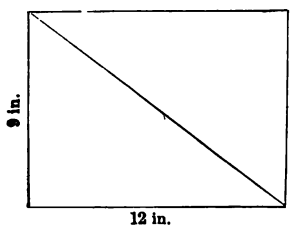
8. How many bottles, each holding 2 qt. 1 pt., can be filled from a can holding 7 gal. 3 qt. of varnish?

NOTE. — Reduce both compound numbers to the same denomination, pints, and divide as in simple numbers.

9. How many sacks, each holding $2\frac{3}{4}$ bushels, can be filled from a bin containing 35 bu. 3 pk.?

27. MISCELLANEOUS PROBLEMS.

1. How many square inches in a rectangular surface which is 9 inches by 12 inches?



2. How many square inches in a triangular pane of glass whose base is 12 inches and whose height is 9 inches?

The area of a triangle is one-half the area of a rectangle with the same base and altitude (height). Consider one side of the triangle as the base; measure from the base to the angle opposite for the altitude. The pane of glass contains $\frac{1}{2}$ of 108 inches, which is 54 inches. $4\frac{1}{2}$ inches (one-half of altitude) multiplied by 12 inches (base) equals 54 inches, area of the triangle.

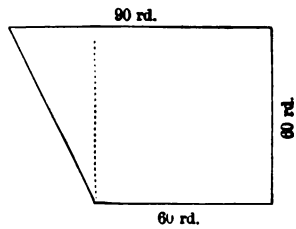
To find the area of a triangle:

Multiply the base by half the altitude.

3. How many square feet in the gable of a house if the base is 25 feet and the altitude $12\frac{1}{2}$ feet?

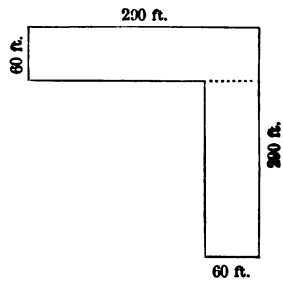
4. How many square rods in a triangular field whose base is 20 rods and altitude 14 rods?

5. Find the number of acres in a farm from the diagram.



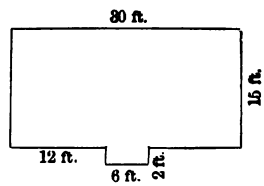
First, find the area of the square, then the area of the triangle.

6. Find from the diagram the number of square yards of tiling used for the floor of a corridor.



Divide into two rectangles and find the area of each.

7. Find the number of square yards in the floor of this room.



Divide into two rectangles, one of which shall be 2 feet by 6 feet.

8. How many square yards in the ceiling?

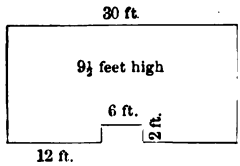
9. How many square yards in the walls of a room 20 feet by 16 feet, and $9\frac{1}{2}$ feet high, if no allowance is made for doors and windows?

The area of the four walls of a room is equal to that of a rectangle whose length is equal to the sum of the four sides, and whose breadth is equal to the height of the room.

2×20 ft. $+ 2 \times 16$ ft. $= 72$ ft. $\quad 72$ ft. $\times 9\frac{1}{2}$ ft. $= 684$ sq. ft.

684 sq. ft. $\div 9 = 76$ sq. yd.

Draw the rectangle which represents the area of the walls of the room.



10. How many square yards in walls, floor, and ceiling of this room?

11. How many square yards in a roof the rafters of which are 16 feet long and the ridge-pole 25 feet long.

12. If the height of a staircase is 15 feet, and that of each step is 9 inches, how many steps are there in the staircase?

13. How many yards of carpet, $\frac{3}{4}$ of a yard wide, will be required to carpet a floor 20 feet by 19 feet?

We must decide whether the strips are to run across the room or lengthwise, and how much must be turned under or cut off. The number of yards in a strip multiplied by the number of strips will give the required number of yards.

In this case we decide to lay the strips across the room; 20 feet divided by $\frac{3}{4}$ of a yard will give the number of strips.

$\frac{3}{4}$ of a yard equals $2\frac{1}{4}$ feet. 20 feet divided by $2\frac{1}{4}$ feet equals $8\frac{8}{9}$ (times). $8\frac{8}{9}$ is the number of strips required. We must buy 9 strips, and turn under or cut off $\frac{1}{3}$ of the width of one strip. 19 feet equals $6\frac{1}{3}$ yards, the length of each strip if we cut the strips the exact length of the room. But if we allow $\frac{1}{3}$ of a yard for turning under, the strips will be $6\frac{2}{3}$ yards in length. $6\frac{2}{3}$ yards $\times$ 9 = 60 yards, the number of yards required.

14. How many yards of carpet, $\frac{3}{4}$ of a yard wide will be required for a floor 24 feet by $15\frac{3}{4}$ feet, if the strips run crosswise?

15. How many yards of carpet, $\frac{3}{4}$ of a yard wide, will be required for a room $7\frac{1}{4}$ yards long, 6 yards wide, if the strips run lengthwise and there is a waste of $\frac{1}{8}$ of a yard in each strip in matching the pattern?

16. How many yards of carpet will be required for a stair of 12 steps, if each step is 18 inches wide and $7\frac{1}{2}$ inches high?

17. How many cords of wood in a pile 40 feet long, 4 feet wide, and $5\frac{1}{2}$ feet high?

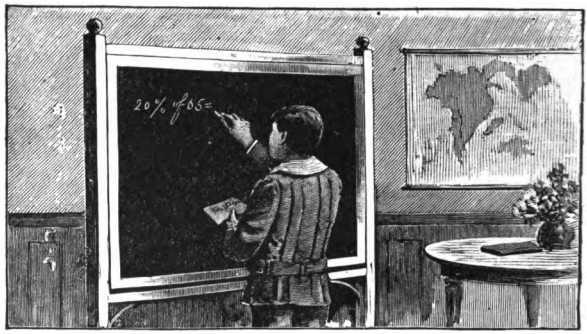
18. How many cords of wood can be piled under a shed 24 feet long, 18 feet wide, and 12 feet high?

19. How many boxes, 4 inches long, 3 inches wide, and 2 inches deep, can be packed in a box 3 feet long, 3 feet wide, and 2 feet deep, measured on the inside?

20. How many fence boards, each 16 feet long, will be required to fence a field 80 rods long and 40 rods wide, the fence being 4 boards high?

21. Mr. A.'s orchard covers $2\frac{1}{2}$ acres. Allowing two square rods for each tree, how many trees are there?

22. How many loads of earth of 1 cubic yard each will be needed to fill in a lot, 45 feet front, 90 feet deep, to raise it $1\frac{1}{2}$ feet?



CHAPTER VII.

PERCENTAGE.

1. 1. A man gave away 6 dollars out of every hundred dollars he had. How many dollars did he give out of 200 dollars? Of 300 dollars? Of 600?

2. 7 is what part of 100? 9 is what part of 100? 1 is what part of 100?

One one-hundredth of a number is one *per cent* of it; two hundredths, two per cent.

The term *per cent* means *by the hundred.*

Any per cent of a number is so many hundredths of it. The *rate per cent* is the rate per hundred.

3. 6 hundredths of a number is what per cent of it? 4 hundredths? 10 hundredths?

4. What per cent of a number is $\frac{5}{100}$ of it? $\frac{17}{100}$? $\frac{25}{100}$? $\frac{68}{100}$? $\frac{100}{100}$? $\frac{150}{100}$?

5. What per cent of a number is .05 of it? .15 of it? .45? .12½? .66⅔? .03⅓?

The character %, called the per cent sign, is used for the words per cent. 8 % is read, 8 per cent. ⅓ % is read, ⅓ of 1 per cent.

6. How many hundredths of a number is 6 % of it? 9 % of it? 10 %? 7½ %? 50 %? 150 %?

2. Any per cent of a number may be expressed in four ways: In words, as a common fraction, as a decimal fraction, and by the per cent sign.

1. Express decimally: 6 %, 11 %, 125 %, 150 %.

$$125\ \% = 1.25$$

2. Express decimally: 12½ %, 18¾ %, 17½ %, 33⅓ %, 87½ %, 112½ %.

$$18\tfrac{3}{4}\ \% = .18\tfrac{3}{4}$$

3. Express, first as a common fraction, then as a decimal: 3 %, 5 %, 8 %, 12½ %, ¾ of 1, ¾ of 1 per cent, ⅝ of 1, ⅝ of 1 per cent, 1 per cent, 3 per cent, ⅓ of 1 per cent.

First, ¾ of 1 % = ¾ of $\frac{1}{100} = \frac{3}{4\,00}$; second, ¾ % expressed decimally = .00¾. *Ans.*

¾ % is how many *ten-thousandths,* expressed decimally.

Write and complete the following table:

½ = .50 = 50 %	¾ = .75 = 75 %	⅘ = ?	⅛ = ?
⅓ = .33⅓ = 33⅓ %	⅕ = .20 = 20 %	⅙ = ?	⅜ = ?
⅔ = .66⅔ = 66⅔ %	⅖ = .40 = 40 %	⅚ = ?	⅝ = ?
¼ = .25 = 25 %	⅗ = .60 = 60 %	1/7 = ?	1/9 = ?

3. To find a given per cent of any number.

1. What is 5 % of 300?

5 % of 300 is $\frac{5}{100}$ of 300. $\frac{1}{100}$ of 300 = 3. $\frac{5}{100}$ of 300 = 15. 5 % of 300 is 15. Expressed decimally, 300 × .05 = 15.

2. What is 4 % of 600? 800? 900? 250?

3. What is 8 % of 200? 300? 480? 560?

Express the rates decimally.

4. What is 7 % of 350? 9 % of 630? 10 % of 900?

5. What is $8\frac{1}{3}$ % of \$984.36? ($8\frac{1}{3}$ % = .$08\frac{1}{3}$.)

6. What is 6 % of \$650.80? $12\frac{1}{2}$ % of \$500?

7. What is $3\frac{1}{3}$ % of 360 days?

8. What is 110 % of 250 bushels?

9. What is 200 % of 250 bushels?

10. What is $\frac{1}{4}$ % of \$60.50? $\frac{1}{3}$ % of \$45?

11. I bought a lot for \$500, and sold it for 8 % more than it cost me; what was my gain?

12. If a lot is bought for \$500, and sold for 6 % less than the cost, what is the loss?

13. In a school of 200 pupils 6 % are absent; how many are absent? How many are present?

14. A man having 400 acres of land gave 25 % of it to his son; how many acres did he give away?

4. To find what per cent one number is of another.

1. 4 is what per cent of 16?

The first step in such problems is to find what part one number is of another. 4 is what part of 16?

1 is $\frac{1}{16}$ of 16. 4 is $\frac{4}{16}$ or $\frac{1}{4}$ of 16. $\frac{1}{4} = \frac{25}{100} = 25\ \%$.

Expressed decimally, 16) 4.00 (.25

32

80

80

2. What per cent of 12 is 4? Of 60 is 12? Of 56 is 8?

3. 8 is what per cent of 72? 15 of 45?

4. What per cent of 90 cents is 15 cents? $12\frac{1}{2}$ cents is what per cent of 75 cents?

5. What per cent of \$640 is \$48?

6. \$27 is what per cent of \$600? \$5.10 of \$85? \$17 of \$85? 50 cents of \$2?

7. $\frac{1}{2}$ mile is what per cent of 2 miles? $6\frac{1}{4}$ bushels of 25 bushels?

8. A boy bought oranges at 3 cents apiece, and sold them at 4 cents apiece. Compare the gain with the cost. What per cent did he make on the cost?

9. A merchant bought silk at \$3 a yard, and sold it at \$4 a yard. Compare the cost with the selling price; the cost is what per cent of the selling price?

10. A rug which cost $3 is sold for $4. The selling price is what per cent of the cost?

NOTE. The selling price *is the cost* plus what per cent of the cost?

5. To find a number when a per cent of it is given.

1. 30 is 6 % of what number?

1 % of the number is $\frac{1}{6}$ of 30, which is 5. The number required, or 100 %, is 100 times 5, which is 500. 30 is 6 % of 500. The same result is obtained by dividing the given number by the rate per cent expressed decimally.

$$(\tfrac{30}{6} \times 100) = (30 \div .06)$$

2. 80 is 10 % of what number? 40? 60?
3. 60 is 30 % of what number? 90? 120?
4. 100 is 50 % of what number? 80? 200?
5. 80 is 100 % of what number? 200? 50?
6. 150 is 150 % of what number? 15? 25?
7. 80 is 12½ % of what number?

Express decimally, .125) 80.000 (640. *Ans.*

750
500
500

Find the number of which:

8. $75.52 is 8 %.
9. $810 is 90 %.
10. $30 is 2 %.
11. $3.35 is 33⅓ %.
12. 300 bushels is 150 %.
13. 300 acres is 200 %.
14. A house rents for $180, which is 6 % of its value; what is its value?

15. An etching cost \$48, which is 80 % of the cost of an engraving; what is the cost of an engraving?

16. The width of a table is 4 feet, which is 80 % of the length. What is the length of the table?

17. If the length of a table is 5 feet, and this is 125 % of the width, how wide is the table?

18. The width of a field is 40 rods, which is 25 % of the length. How long is the field?

6. INTEREST.

1. If I borrow \$100, and pay \$6 for the use of it for a year, what per cent of the \$100 do I pay?

2. If I had paid 6 % of the \$100, how much money would I have paid? 5 %? 7 %? 8 %?

Money paid for the use of money is called Interest. It is reckoned at a given rate per cent by the year.

The money on which the interest is paid is called the Principal.

The sum of principal and interest is called the Amount.

3. What is the interest of \$200 for one year at 6 %? For 2 years?

What is the interest on:

4. $200 for 1 year at 5 % ?
5. $300 for 2 years at 5 % ?
6. $400 for 3 years at 5 % ?
7. $200 for 2½ years at 6 % ?
8. $100 for 6 months at 6 % ?
9. $300 for 1 yr. 6 mo. at 4 % ?

7. 1. What is the interest on $320 for 2 yr. 8 mo. and 26 d. at 8 % ?

$320
.08
12) $25.60 int. for 1 yr.
30) 2.133 int. for 1 mo.
.0711 int. for 1 d.
26
4266
1422
$1.8486 int. for 26 d.

2 yr. 8 mo. = 32 mo.
$2.133 int. for 1 mo.
32
4266
6399
$68.256 int. for 2 yr. 8 mo.
1.848 int. for 26 d.
$70.104 int. for 2 yr. 8 mo. 26 d.

What is the interest on:

2. $450 for 1 yr. 9 mo. 12 d. at 6 % ? At 7 % ?
3. $600 for 2 yr. 3 mo. 16 d. at 5 % ? At 8 % ?
4. $80.75 for 2 yr. 6 mo. 12 d. at 6 %. At 4 % ?
5. Find the amount of $190.80 for 2 yr. 9 mo. at 6 %.
6. Find the amount of $200 for 5 yr. 4 mo. 20 d. at 4 %.

Find the amount:

7. $650, from Oct. 4, 1884, to May 6, 1886, at 6 %.

8. $1200, from Nov. 15, 1884, to March 1, 1887, at 5 %.

8. ORAL REVIEW.

1. 6 is 50 % of what number? 6 is 50 % more than what number? 6 is 150 % of what number?

2. 8 is 200 % of what number? 8 is 100 % more than what number?

3. 9 is 25 % of what number? 9 is 25 % less than what?

4. Sold a lamp for $6, and gained $1; what per cent did I gain?

5. If a lamp is bought for $5, and sold at 20 % profit; what is the selling price?

6. If chestnuts are bought at 8 cents a quart and sold at 12 cents, what is the gain per cent?

7. In a school of 60 pupils, 80 % entered on the first day of the term; how many have entered the school since?

8. If pineapples are sold at 15 cents each, and this is 25 % more than the cost, what was the cost?

9. If pineapples are bought for 12 cents each, and sold for 16 cents, what per cent is gained?

10. Henry is 4 feet, 5 inches tall, and his brother is 20 % taller; how many feet tall is his brother?

11. A boy bought cherries at 12½ cents a quart, and sold them at 200 % on the cost; for what did he sell them?

12. A number which is 25 % less than 12 is what per cent of 12?

13. 5 pounds of soap lost 4 ounces by drying; what per cent of the original weight was water?

14. Cloth which cost $1.25 a yard was sold for $1.37½; what was the gain per cent?

15. For what must cloth which cost $1.25 a yard be sold to gain 10 %?

16. If I sell cloth for $1.50 a yard, at a gain of 12½ cents a yard, what per cent do I gain?

17. $8 is 50 % less than the cost of a coat; what is the cost?

18. A man sold a horse for $120, and thereby gained ⅕ of the cost; what per cent did he gain? $120 is how many fifths of the cost?

19. From a hogshead containing 63 gallons of molasses 12 gallons leaked out. What per cent of the whole was the leakage?

20. What number diminished by 50 % of itself equals 15? 200? 150?

21. What number increased by 50 % of itself equals 15? 150? 300?

22. 15 is how many times 10? 15 is what per cent of 10?

23. A barrel of flour sells for $8.40 at a profit of 20 %; what was the cost?

24. After 30 % of a mast had been broken off by the wind, it was 105 feet high; what was the height at first?

25. The length of a shadow cast by a tree is 28 % longer than the height of the tree. If the tree is 72 feet high, how long is the shadow?

26. If $12 at interest for 3 years gains $2.16, what will be the interest for one year? On $1 for one year.

27. If $6 gain $1.08 in 3 years, how much will $1 gain in one year?

28. If $1 gains 9 cents in a year, how long will it take it to gain 72 cents? How long will it take $4, at the same rate, to gain the same amount?

29. If $1 gains 5 cents in a year, how long will it take $6 to gain 90 cents?

30. If $1 earns 6 cents in a year, how many dollars will earn $1.80 in 3 years?

CHAPTER VIII.

MISCELLANEOUS PROBLEMS.

NOTE. The following problems do not constitute a necessary part of an elementary course in arithmetic. They are added here because of their value for review work, or for use by pupils who may be somewhat in advance of the class.

CANCELLATION.

1. How many bushels in 8 boxes of beans, each containing 20 quarts?

2. The factors of a dividend are 16, 50, and .9; of the divisor, .15, 8, and 2. What is the quotient? Divide 56×14.4 by 14.

3. A farmer gave 55 sheep for 11 young horses worth $60 each. What money value did he get for each sheep? $\frac{2}{3}$ of $\frac{7}{11}$ of $\frac{3}{14} = ?$

4. How many barrels of 36 gallons each will contain as much as 12 hogsheads of 63 gallons each?

5. If 1 man can mow 6 acres of grass in a day, how many men will it take to mow 3 fields of 56 acres each?

6. At 60 cents a cord, how many days will it take a man to earn $75.00, if he saws 2 cords of wood a day?

7. If a turkey weighing $10\frac{1}{2}$ pounds cost $1.68, what will be the cost of one that weighs $15\frac{3}{4}$ pounds?

COMMON FRACTIONS.

1. At $\frac{3}{8}$ of a dollar per yard, how many yards of cloth can be bought for $\frac{5}{8}$ of a dollar?

2. At the rate of $2\frac{1}{2}$ dollars for 3 baskets of peaches, what is that per basket?

3. If I use $\frac{3}{4}$ of a pound of sugar in making one cake, how many cakes can I make with $2\frac{1}{2}$ pounds?

4. Helen divided $1\frac{3}{4}$ pounds of nuts equally among 5 playmates. What part of a pound did each receive?

5. Horace divided 5 apples equally among 6 boys. What part of one apple did each receive?

6. At $1\frac{1}{2}$ dollars each, how many lamps can be bought for $6\frac{2}{5}$ dollars?

7. A man divided $8\frac{2}{5}$ dollars among his children, giving them $1\frac{1}{5}$ dollars apiece. How many children had he?

8. At $2\frac{1}{3}$ dollars a box, how many boxes of lemons can be bought for $6\frac{1}{3}$ dollars?

9. At $\frac{7}{10}$ of a dollar per yard, how many yards of ribbon can be bought for $2\frac{4}{5}$ dollars?

10. A gentleman gave away $\frac{1}{6}$ of the books in his library, lent $\frac{1}{5}$ of the remainder, and sold $\frac{1}{4}$ of what was left. He then had 360 books remaining. How many had he at first?

11. If a lady spends $4\frac{2}{5}$ dollars per month for car fare, in what time will she spend $\$27\frac{1}{2}$?

DECIMAL FRACTIONS.

1. The owner of a schooner sells .35½ of the vessel to the captain. What part does he still own?

2. The minuend is 67.081. What must the subtrahend be to leave a remainder of 56.009?

3. The less of two numbers is 3207.56 and their difference is 978.756. Find the greater number.

4. A. owns $\frac{7}{10}$ of an iron foundry and sells .75 of his share for $2100. What is the value of the whole foundry?

5. What is the gain on 5000 bushels of wheat bought in Chicago at $1.4375 per bushel and sold in New York at $1.625 per bushel, allowing 15 cents per bushel for transportation?

6. A flour merchant bought 137 barrels of flour at $7.875 per barrel. He sold 89 barrels at $9.378 per barrel, and the remainder brought only $5.80 per barrel. What was his gain?

7. Two men start from the same place and travel in opposite directions. One travels 119.33 miles a day, and the other 123.75 miles a day. How far will they be apart at the end of six days?

8. I sold .36 of my land for $900. How much is the remainder of it worth at the same rate?

9. Divide $3679.94 by $5.004.

10. Divide 6504.5 yards by 5.06 yards.

MENSURATION.

1. Supposing each child in a schoolroom ought to have 80 cubic feet of air, how many children should sit in a room which is 20 feet long, 18 feet wide, and 12 feet high?

2. How many tiles, each 3 inches square, will cover the space around a fireplace 5 feet long and 3 feet wide?

3. The walk from our kitchen door to the stable is 75 feet long and 4.5 feet wide. How many bricks in it, each brick being 8 inches by 4 inches?

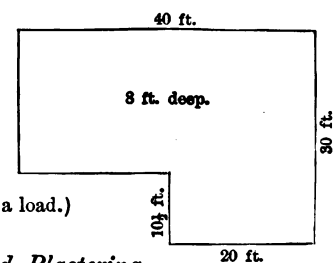
4. How many times is 4 cubic inches contained in a four-inch cube?

5. How many cubic inch blocks will a box contain which is 1 ft. long, $\frac{3}{4}$ ft. deep, and 8 in. wide?

6. How many gallons will fill a tank $8\frac{1}{2}$ feet by $6\frac{1}{2}$ feet by 5 feet? (231 cubic inches in a gallon.)

7. How many loads of earth must be removed in digging a cellar of the dimensions given in the diagram.

(A cubic yard is understood to be a load.)



Papering and Plastering.

1. How many square yards of plastering in the 4 walls of a room 14 ft. long, $12\frac{1}{2}$ ft. wide, and 8 ft. high, if no allowance is made for doors and windows?

2. How many square yards of plastering in the ceiling of a room $15\frac{2}{3}$ feet long by 14 feet wide? If this room is 9 feet high above the baseboard, how many square yards in the walls and ceiling together, no allowance for doors and windows?

3. How many square yards of plastering in the walls and ceiling of a room 16 feet long, $14\frac{1}{2}$ feet wide, and 9 feet high, if 14 square yards be allowed for doors, windows, and baseboard?

4. How many rolls of paper 18 in. wide will be required to paper the walls of a room 20 ft. long, 19 ft. wide, and 9 ft. high, deducting 60 sq. ft. for the surface of one door and two windows, and allowing $\frac{1}{2}$ a roll for waste in matching?

(The height is measured from the top of the baseboard.)

NOTE 1. The cheapest wall paper is 18 in. wide. In American paper, the single rolls are 8 yd. long; the double rolls are 16 yd. long. A single roll is understood unless a double roll is given in the problem. There are 36 sq. ft. of covering surface in a single roll of 18 in. paper (24 ft. $\times$ $1\frac{1}{2}$ ft. = 36 sq. ft.).

NOTE 2. The walls of a room 20 ft. by 19 ft. and 9 ft. high, make a rectangle 78 ft. long by 9 ft. wide, which contains 702 sq. ft. Deducting 60 sq. ft. for doors and windows (20 sq. ft. for each), there are 642 sq. ft. 642 sq. ft. $\div$ 36 sq. ft. = $17\frac{5}{6}$. Adding $\frac{1}{2}$ a roll for waste, $18\frac{1}{3}$ rolls is the amount required.

5. How many rolls of paper 30 in. wide will be required to paper the walls and ceiling of a room 30 ft. long, 26 ft. wide, and 10 ft. high, allowing 120 sq. ft. for doors and windows, and $\frac{2}{3}$ of a roll for waste?

(How many square feet of surface in a single roll of 30 in. paper?)

BOARD MEASURE.

NOTE 1. Board measure is a kind of surface measure, and is employed in measuring lumber. The unit of lumber measurement is a *board foot*, which is 1 foot long, 1 foot wide, and 1 inch thick. Lumber 1 inch or less in thickness is considered inch-lumber.

1. How many feet of lumber in a board 15 feet long, 9 inches wide, and 1 inch thick?

NOTE 2. When a board is 12 feet long, every inch in width is equivalent to a board foot. This board is 15 feet long and every inch in width is equivalent to $1\frac{1}{4}$ board feet. $15 \div 12 = 1\frac{1}{4}$. $1\frac{1}{4} \times 9 = 11\frac{1}{4}$ (board feet).

To find the number of feet of lumber in a board 1 inch or less in thickness:

Multiply the length in feet by the width in inches and divide the product by 12.

2. How many feet of lumber in a board 20 feet long and 10 inches wide? How many in a board 16 feet long and 7 inches wide?

3. How many feet of lumber in a plank 15 feet long, 18 inches wide, and 3 inches thick?

NOTE 3. The measurement of this plank is equal to the measurement of three inch-boards of the same length and width.

4. How many feet of lumber in a plank 18 feet long, 9 inches wide, and $1\frac{1}{2}$ inches thick?

(Every sq. ft. of this plank is equal to $1\frac{1}{2}$ board feet.)

5. How many feet of lumber in a pile of twenty boards 16 feet long, 10 inches wide, and $\frac{1}{2}$ an inch thick? (See note 1 above.)

6. How many feet of lumber in a board 14 feet long, 9 inches wide at one end, and 5 inches wide at the other, tapering uniformly?

PERCENTAGE.

1. A grocer sold apples at $1 a bushel, which was 125% of their cost. Find the cost per bushel?

2. By selling a knife for 75 cents a boy gains 25% on the cost. What was the cost of the knife?

(Hint: 75 cents is what per cent of the cost?)

3. By selling a book for 75 cents I lost 25% on the cost. What was the cost of the book?

4. Henry sold a pair of skates for 90 cents, thereby losing 40% of the cost. What did he pay for the skates?

5. A boy received a half-peck of cherries for every bushel he picked. What per cent did he receive?

6. Henry had $1.80 and spent 72 cents for a box of water colors. What per cent of his money did he spend?

7. A man sold a horse for $120 and thereby gained $\frac{1}{8}$ of the cost. What per cent did he gain?

8. A horse was bought for $160 and sold for $120. What was the loss per cent?

9. A box of slippers containing one dozen pairs cost $21. I wish to sell them so as to gain $33\frac{1}{3}$%. For what price must I sell each pair?

10. Out of 30 bushels of potatoes, $2\frac{5}{10}$ bushels were unfit for use. What per cent of them were sound?

11. James buys a knife for 50 cents and sells it to Fred for 60 cents; what per cent does he gain? Fred sells the knife to Tom for 50 cents; what per cent does he lose? Can you explain the difference in these rates?

12. A man owing \$500 agrees to pay the debt in instalments, the first to be 50 % of the whole, the second 25 %, the third 15 %, the fourth 10 %; what will be the amount of each payment?

NOTE. Dealers buy many kinds of goods at less than list prices, such allowance, when made, being reckoned at an agreed per cent of list price. This allowance is called *trade discount.*

13. The Bowen-Merrill Company ordered books which at list amounted to \$150. The discount allowed was $16\frac{2}{3}$ %. What was the amount of the bill?

14. If the books purchased in the last example are sold at list, or for a total of \$150, what is the gain per cent on the purchase price?

15. Find the gain per cent on the purchase price if the above books are sold at 10 % advance on list prices. At 20 %. At 25 %.

16. Ten sets of wall maps listed at \$25 per set were sold to a school board at 25 % discount. The party selling them purchased the maps from the manufacturer at 50 % discount from the list price. What per cent profit did he make on the purchase price?

INTEREST.

1. Mrs. Dewey has 24 government bonds of $1000 each, bearing 4 % interest. What is her annual income from these bonds?

2. A borrowed $360 of his neighbor, agreeing to pay him interest at the rate of 7 % per annum. At the end of 2½ years A paid the principal and interest. What was the amount paid?

3. Mr. Simmons sold his saddle horse to Dr. Jordan for $150, receiving cash $60, and a note for the remainder bearing 6 % interest, due 1 year and 9 months from date. What was due on this note when it matured?

4. Henry Nelson worked 7 months for Nickel & Co. at $60 per month, drawing ⅓ of his salary each month. At the end of the 7 months he received cash for one-half the amount then due him, and a note for the remainder due in 9 months at 8 % interest. What was the amount of the note at maturity?

5. Mr. Jones owes an account amounting to $60, which is past due 4 months. He agrees to give his note due 1 year from date at 7 % interest for the amount of the account plus the interest at 6% for the 4 months it has been overdue. What will be the face of the note, and what the amount at its maturity?

Find the interest on the following:

6. $550 for 1 yr. 3 mo. at 6 %.
7. $250 for 2 yr. 4 mo. at 8 %.
8. $300 for 3 yr. 6 mo. at 7 %.
9. $160 for 1 yr. 2 mo. at 6 %.
10. $6 for 5 yr. 9 mo. at 6 %.
11. $1.50 for 3 yr. 6 mo. at 3 %.
12. $4.75 for 4 yr. 3 mo. at 4 %.
13. $890 for 3 yr. 7 mo. at 10 %.

Find the interest on the following:

14. $200 at 6 % from Oct. 12, 1860, to June 12, 1862.
15. $300 at 5 % from May 10, 1864, to Aug. 10, 1865.
16. $250 at 8 % from July 15, 1865, to Oct. 15, 1867.
17. $175 at 6 % from Jan. 16, 1866, to May 16, 1869.
18. $405 at 7 % from April 10, 1868, to June 10, 1870.
19. $750 at 5 % from Nov. 15, 1870, to Nov. 30, 1872.
20. $840 at 6 % from April 10, 1872, to May 20, 1875.
21. $25 at 6 % from June 5, 1873, to July 20, 1879.
22. A loaned B $300 on his note at 6 % for 3 years. When the note was due B paid $40, and gave a new note at the same rate of interest, running 1 year, for the balance then due. This note he paid at maturity. How much interest did B pay for his $300?

METRIC SYSTEM OF WEIGHTS AND MEASURES.

The metric standard for the measurement of distances is the **Meter** which is 39.37 inches long (very nearly 3 feet $3\frac{3}{8}$ inches). From the *meter* all other measures of this system are derived, and hence the name **Metric System.** Since the meter is divided decimally, the system is simple and convenient. Ten units of a lower order make one of the next higher in any measure. Scientists use the metric system almost universally.

The pupil can easily make for himself a **meter stick** by cutting a stick 3 feet $3\frac{3}{8}$ inches long. If this be divided by cross lines into ten equal parts, one part will be a *decimeter* (dm.). Dividing the dm. into ten equal parts will give the *centimeter* (cm.), and dividing the cm. into ten equal parts will give the *millimeter* (mm.). This last division the pupil need not make at first.

Let him make a cubic box whose inside edge is measured by a dm., and he will have a **Liter Measure**, the unit of liquid and dry measure. Let him make a small cube whose edge is measured by a cm. and he will have the size from which the **Gram**, the unit of weight, is determined. (A cubic cm. of pure water is the weight of the gram.)

TABLE OF LINEAR MEASURE.

10 milli-meters = 1 centi-meter.
10 centi-meters = 1 deci-meter.
10 deci-meters = 1 **Meter.**
10 meters = 1 deka-meter.
10 deka-meters = 1 hecto-meter.
10 hecto-meters = 1 kilo-meter.
10 kilo-meters = 1 myria-meter.

Compare with the decimal notation:

Names of Orders used in Notation and Numeration.	10 thousands.	thousands.	hundreds.	tens.	units.	.	tenths.	hundredths.	thousandths.
	0	0	0	0	0	·	0	0	0
Corresponding Names applied to Metric Linear Measure.	myria-meter.	kilo-meter.	hecto-meter.	deka-meter.	meter.		deci-meter.	centi-meter.	milli-meter.

Additional metric tables may be constructed by substituting *liter* for *meter*, *gram* for *meter*, etc. Applications can be given by simple examples easily made or readily selected.

ANSWERS.

Page 49. Article 61.—1. 42. 2. 47. 3. 61. 4. 68. 5. 53. 6. 56. 7. 96. 8. 95. 9. 46. 10. 56. 11. 67. 12. 89. 13. 66. 14. 86. 15. 75. 16. 75.

Page 52. Article 66.—1. 180. 2. 189. 3. 180. 4. 189. 5. 190. 6. 189. 7. 190. 8. 188. 9. 219. 10. 187. 11. 190. 12. 186. 13. 190. 14. 185. 15. 189. 16. 190. 17. 189. 18. 200.

Page 54. Article 69. Vertical Columns.—1. 59. 2. 61. 3. 50. 4. 69. 5. 50. 6. 60. 7. 58. 8. 59. 9. 49. 10. 60. 11. 60. 12. 51.

Page 54. Article 70.—1. 590. 2. 490. 3. 500. 4. 498. 5. 599. 6. 509. 7. 499. 8. 589. 9. 600. 10. 501.

Page 58. Article 73.—1. 397. 2. 406. 3. 388. 4. 380. 5. 398. 6. 422. 7. 395. 8. 370. 9. 369. 10. 488.

Page 59. Article 74.—1. 499. 2. 489. 3. 492. 4. 500. 5. 487. 6. 399. 7. 400. 8. 490. 9. 500. 10. 509.

Page 59. Article 75.—1. 47 c. 2. 11 c. 3. $28. 4. $2. 5. 28 or. 6. 21 c. 7. 81 ft. and 99 ft. 8. 15 c. and 7¼ c. 9. 60 c.

Page 62. Article 77.—1. 500. 2. 600. 3. 599. 4. 609. 5. 508. 6. 502. 7. 589. 8. 590. 9. 609. 10. 597. 11. 509. 12. 580.

Page 63. Article 78.—1. 701. 2. 609. 3. 590. 4. 700. 5. 690. 6. 600. 7. 681. 8. 691. 9. 582. 10. 691. 11. 710. 12. 790.

Page 63. Article 79.—1. 25 c. 2. 52 c. 3. 25 hrs. 4. 36 pupils. 5. 79 shingles. 6. 21 c. 7. 67 c. 8. 10 ft. and 6 ft. 9. 15 c. and 10 c. 10. 5 packages.

Page 78. Article 22.—2. 33 p. 4. 18 qts. 5. 8 gals. 6. 4⅔ yds. 7. 7 spools and 8 spools, 3 c. rem. 8. 15 A. 9. 4¼ hrs. 10. 9½lbs. 11. ¾ pks. 12. 40 qts.

Page 80. Article 23.—1. 598. 2. 539. 3. 583. 4. 413. 5. 608. 6. 601. 7. 410. 8. 590. 9. 548. 10. 580.

Page 80. Article 24.—1. 599. 2. 639. 3. 590. 4. 638. 5. 482. 6. 609. 7. 519. 8. 660. 9. 510. 10. 606.

Page 81. Article 25.—1. 590. 2. 690. 3. 590. 4. 611. 5. 609. 6. 591. 7. 621. 8. 599. 9. 603. 10. 700.

Page 81. Article 26.—1. $71. 2. $102. 3. $11. 4. $40. 5. 16 qts. 6. 82 p. 7. $65. 8. 64 mi. 9. $42. 10. 91 ft. 11. 42 ft.

Page 83. Article 27.—1. 612. 2. 630. 3. 793. 4. 610. 5. 711. 6. 681. 7. 703. 8. 617. 9. 611. 10. 603. 11. 790. 12. 811. 13. 608. 14. 591.

Page 84. Article 29.—1. 702. 2. 619. 3. 711. 4. 720. 5. 802. 6. 710. 7. 721. 8. 630. 9. 691. 10. 709. 11. 709. 12. 712. 13. 518. 14. 595.

Page 87. Article 31.—1. $5.12. 2. $6.78. 3. $6.20. 4. $6.90. 5. $5.85.

Page 88. Article 32.—1. $21.26. 2. $19.55. 3. $7.00. 4. $3. 5. $14. 6. $1.

Page 88. Article 33.—1. $1. 2. $32. 3. $1.50. 4. $40, $10. 5. $8.05. 6. 5½ yds. 7. 66 h. w. 8. 4 yds. 9. 3 boxes. 10. $8.60. 11. 901 ft.

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Page 89. Article 34.—**1.** 608. **2.** 591. **3.** 501. **4.** 609. **5.** 609. **6.** 569. **7.** 600. **8.** 601.

Page 90. Article 34 (*continued*).—**9.** 689. **10.** 610. **11.** 691. **12.** 617. **13.** 607. **14.** 531. **15.** 851. **16.** 509. **17.** 579. **18.** 561. **19.** 596. **20.** 600. **21.** 610. **22.** 681. **23.** 698. **24.** 696.

Page 91. Article 36.—**1.** 118. **2.** 229. **3.** 229. **4.** 219. **5.** 210. **6.** 229. **7.** 119. **8.** 206. **9.** 208. **10.** 108. **11.** 218. **12.** 109. **13.** 218. **14.** 317. **15.** 178. **16.** 128.

Page 92. Article 36 (*continued*).—**17.** 139. **18.** 118. **19.** 28. **20.** 27. **21.** 109. **22.** 124. **23.** 25. **24.** 29. **25.** 117. **26.** 117. **27.** 45. **28.** 53. **29.** 117. **30.** 127. **31.** 12. **32.** 34. **33.** 147. **34.** 136. **35.** 26. **36.** 23. **37.** 106. **38.** 116. **39.** 26. **40.** 61. **41.** 116. **42.** 123. **43.** 24. **44.** 29. **45.** 114. **46.** 122. **47.** 35. **48.** 9. **49.** 125. **50.** 135. **51.** 48. **52.** 87. **53.** 106. **54.** 89. **55.** 91. **56.** 71. **57.** 108. **58.** 59. **59.** 97. **60.** 69. **61.** 45.

Page 92. Article 37.—**1.** 5 mi., 30 mi. **2.** $40. **3.** $51. **4.** 92 c. **5.** 198 or. **6.** $105. **7.** $145. **8.** 100 tr. **9.** 229 tr. **10.** 991. **11.** $299. **12.** 294 ft.

Page 95. Article 41.—**1.** 6008. **2.** 6095. **3.** 6767. **4.** 6008. **5.** 6760. **6.** 6712.

Page 96. Article 41 (*continued*).—**7.** 6118. **8.** 6120. **9.** 6092. **10.** 6108. **11.** 5921. **12.** 5908.

Page 96. Article 42.—**1.** 7 qts. **2.** 3¼ pks. **3.** 30 da. **4.** $36. **5.** 3 s. **6.** 24 pt. bottles. **7.** 4 da. **8.** 144 mi. **9.** $168. **10.** 640 pairs.

Page 97. Article 43.—**1.** 4089. **2.** 4898. **3.** 6798. **4.** 2889. **5.** 5989. **6.** 3989. **7.** 8809. **8.** 3708. **9.** 4987. **10.** 2879. **11.** 4896. **12.** 2999. **13.** 1809. **14.** 3895. **15.** 4889. **16.** 5987. **17.** 7899. **18.** 6909. **19.** 4789. **20.** 4478. **21.** 6818. **22.** 6078. **23.** 4799. **24.** 4989.

Page 97. Article 44.—**1.** 6110. **2.** 6782. **3.** 6073. **4.** 5960. **5.** 6063. **6.** 4308. **7.** 6000. **8.** 5788. **9.** 5206. **10.** 5990. **11.** 5298. **12.** 5000. **13.** 6776. **14.** 6120. **15.** 5606. **16.** 5120. **17.** 6727. **18.** 5608.

Page 98. Article 45.—**1.** 21 c. **2.** 60 mi. **3.** $2. **4.** $260. **5.** 42 marbles. **6.** $28. **7.** $34.50. **8.** 31 ft. **9.** $300. **10.** 190 sh. **11.** $2.25. **12.** 250 shingles. **13.** $78.50 horse cost, $39.25 cost of cow, $39.25 left.

Page 109. Article 17.—**1.** 45 bu. **2.** 35 ad., 7 ad. left. **3.** 49 yrs. **4.** 12 bu. **5.** 31 c. **6.** 42 wheels. **7.** 1 bu. **8.** 42 pickets. **9.** 6 c. **10.** 35 leaflets. **11.** 24 oz. **12.** 6 oz. **13.** 15 lbs. **14.** 5 lbs. **15.** 10½ lbs. **16.** 16. **17.** 39. **18.** 25. **19.** 8. **20.** 36. **21.** 7. **22.** 4 times. **23.** 42.

Page 111. Article 18.—**1.** 4056. **2.** 5488. **3.** 7110. **4.** 4818. **5.** 5118. **6.** 5802.

Page 112. Article 19.—**1.** 3919. **2.** 4490. **3.** 3601. **4.** 5159. **5.** 4000. **6.** 4909.

Page 112. Article 20.—**1.** 60 hrs. **2.** 180 sec. **3.** $3.40. **4.** 2598 bu. **5.** $420. **6.** 3500 cans. **7.** $320. **8.** $550. **9.** 600.

Page 114. Article 22.—**1.** 4076. **2.** 4917. **3.** 7890. **4.** 5878. **5.** 8088. **6.** 4987. **7.** 8895. **8.** 7789. **9.** 4876. **10.** 9007. **11.** 4909. **12.** 8889. **13.** 5807. **14.** 2909. **15.** 5887. **16.** 8798. **17.** 3976. **18.** 4869.

Page 114. Article 23.—**1** 5281. **2.** 5690. **3.** 4100. **4.** 5090. **5.** 4090. **6.** 4290.

Page 115. Article 24.—**1.** ½ of the money. 75 c. **2.** $45. **3.** 16 qts. **4.** ⅛ of a melon. **5.** 10½ pts. **6.** 57 marbles. 54 marbles Frank has. **7.** 140 ft. **8.** $4.25. **9.** $560. **10.** 370 ft.

Page 116. Article 25.—1. 5741. 2. 5690. 3. 5999. 4. 6096. 5. 5400. 6. 5001. 7. 5510. 8. 5699. 9. 4021. 10. 4130. 11. 5941. 12. 5920. 13. 4829.

Page 117. Article 26.—1. 7679. 2. 7080. 3. 7998. 4. 5790. 5. 8919. 6. 7987. 7. 3897. 8. 2857. 9. 4979. 10. 4809. 11. 5099. 12. 3989. 13. 8896. 14. 1608. 15. 6806. 16. 6896. 17. 4999. 18. 1968.

Page 117. Article 27.—1. \$5.90. 2. \$108 for fruit-trees, \$210 for shade-trees. 3. \$600. 4. \$889. 5. 175. 6. 35 yrs. 7. 450.

Page 119. Article 29.—1. 5222. 2. 4629. 3. 4922. 4. 5222. 5. 5890. 6. 6021. 7. 5100. 8. 5900. 9. 5191. 10. 7282.

Subtract: 1. 7099. 2. 7767. 3. 3965. 4. 3898. 5. 6509. 6. 2989. 7. 4987. 8. 3869. 9. 6999. 10. 1996.

Page 120. Article 30.—1. 5255. 2. 5555. 3. 5733. 4. 6409. 5. 5210. 6. 5933. 7. 5030. 8. 6330. 9. 6091. 10. 5218. 11. 6023. 12. 5234.

Page 121. Article 31.—1. 687 mi. 2. \$4459. 3. \$759. 4. 1904, 1914, 2044. 5. \$2015. 6. 86 bbls. \$417.

Page 122. Article 32.—1. 5325. 2. 5334. 3. 6101. 4. 7105. 5. 5139. 6. 5690. 7. 5702. 8. 5100. 9. 5900. 10. 6120.

Subtract: 1. 6267. 2. 5769. 3. 4099. 4. 4889. 5. 4407. 6. 5777. 7. 779. 8. 887. 9. 469. 10. 1789. 11. 4387. 12. 3098.

Add: 1. 7009. 2. 6099. 3. 6000. 4. 6009. 5. 6009. 6. 7023. 7. 5220. 8. 6439. 9. 6122.

Page 128. Article 12.—1. ½. 2. \$66. 3. 63 desks. 4. 48 ft. 5. 65 c. 6. 63 sheep.

Page 133. Article 17.—1. 63 da. 2. 9 p. 3. 5 min. 4. 57 sq. ft. 5. 6½ lbs.

Page 134. Article 17 (*continued*).—6. 4¼ ft. 7. 60 qts. 8. 9 rides. 9. 8 bu., 32 pks, 48 bu. 10. 50 c. 11. 10 da. 12. 6 sides, 54 plants. 13. 54 hrs. 14. 16 bu. 15. 4 c.

Page 135. Article 19—1. 5191. 2. 5311. 3. 4701. 4. 5104. 5. 5609. 6. 6063. 7. 6233. 8. 5309. 9. 5971. 10. 6210.

Page 136. Article 20.—1. 5269. 2. 5569. 3. 6200. 4. 5260. 5. 5305. 6. 5023.

Page 136. Article 21.—1. 680. 2. 2500. 3. 988. 4. 451 people. 5. \$6.50; 50 c. loss.

Page 137.—Add: 6. 7203. 7. 6228. 8. 5229. 9. 5220. 10. 7121.

Page 138. Article 22.—1. 5478. 2. 4558. 3. 4788. 4. 5290. 5. 5420. 6. 6312. 7. 7102. 8. 6031. 9. 5003. 10. 5623. 11. 4332. 12. 5200.

Page 138. Article 23.—1. 4069. 2. 15. 3. 4162. 4. 4693. 5. 2614. 6. 3749. 7. 7555. 8. 3595. 9. 666. 10. 2706. 11. 2576. 12. 4767. 13. 3687. 14. 4288. 15. 3258. 16. 169. 17. 868. 18. 4969. 19. 2989. 20. 1099. 21. 4596. 22. 6569. 23. 3999. 24. 6999.

Page 139. Article 24.—1. 645. 2. 385 gals. 3. 257 mi. 4. 56 bu. 5. \$2290. 6. \$1750.

Page 139. Article 25.—1. 5303. 2. 6331. 3. 5313. 4. 6201. 5. 7823. 6. 6919. 7. 5332.

Page 140.—Find differences: 1. 8908. 2. 7909. 3. 3896. 4. 2996. 5. 6078. 6. 3396. 7. 1987. 8. 1639. 9. 1996. 10. 4309. 11. 3799. 12. 1878. 13. 769. 14. 5798. 15. 8667.

Page 140. Article 26.—1. 4922. 2. 7933. 3. 5112. 4. 4093. 5. 5144.

Page 141. Article 27.—6. 5334. 7. 6321. 8. 7123. 9. 7204. 10. 7122. 11. 7311. 12. 5764. 13. 4909. 14. 5489. 15. 6404. 16. 6243. 17. 6203.

Page 141. Article 28.—1. 1895 − 1492 = 403. 2. 4, 6 in. squares. 3. $6.60 spent, $1.40 rem. 4. $150. 5. $4.73. 6. $2.85. 7. $8.07. 8. $15.04. 9. $7.11.

Page 144. Article 29.—1. 6342. 2. 6121. 3. 6228. 4. 5108. 5. 5898. 6. 6120. 7. 7381. 8. 6284. 9. 6248. 10. 5290. 11. 4450. 12. 5343. 13. 6432. 14. 5531. 15. 5908.

Page 156. Article 20.—1. 8 p. 2. 80 c. 3. 12. 4. 12 c. 5. 16 stamps. 6. 66 c. 7. 8 mos. 8. 10. 9. 96 inches. 10. 8 bouquets. 11. 8 doz. 12. 37½ c. 14. 75 c. 15. 6 p. 16. 56 cu. in.; 84 cu. in.; 112 cu. in.

Page 158. Article 21.—1. 7220. 2. 7113. 3. 7280. 4. 7320. 5. 6943. 6. 7340. 7. 7210. 8. 7108. 9. 7215. 10. 8010. 11. 8133. 12. 7132. 13. 7349. 14. 8020. 15. 5080. 16. 5203. 17. 5965. 18. 6009. 19. 6013. 20. 5909. 21. 5201.

Page 159. Article 21.—1. 9267. 2. 5939. 3. 5659. 4. 7509. 5. 2407. 6. 5106. 7. 696. 8. 847. 9. 608. 10. 1628. 11. 667. 12. 3066. 13. 2087. 14. 3628. 15. 4069.

Page 159. Article 22.—1. 6 in. 2. 12 wks. 3. $330. 4. $12½. 5. $2.75. 6. $131. 7. $400. 8. 50 da. 9. 30 c.; 72 c. 10. $6. 11. 1200 mi. 12. 10 pupils. 13. $4. 14. 75 c. 15. 48 cu. in. blks. 16. $3. 17. 166⅔ yds. 18. $1.80.

Page 164. Article 6.—1. 756. 2. 1712. 3. 1008. 4. 1956. 5. 1418. 6. 1536. 7. 1960. 8. 618. 9. 4046. 10. 1972. 11. 9014. 12. 9318. 13. 9418. 14. 936. 15. 1526. 16. 1698. 17. 698. 18. 1572. 19. 1210.

Page 166. Article 8.—Divide by 2: 1. 3699. 2. 4124½. 3. 4890½. 4. 3202. 5. 3585. 6. 4705. 7. 3588. 8. 628½. 9. 3364½. 10. 1007½. 11. 2409½. 12. 4598½.

Page 167. Article 10.—1. 4937½. 2. 3000½. 3. 4673½. 4. 3595. 5. 1549. 6. 2864½. 7. 4050½. 8. 3950. 9. 3500½ bu. 10. 2522½ pks.

Page 167. Article 11.—1. 143 mi. 2. 156 times. 3. 326 times. 4. 275 da. 5. 57 albums. 6. 1500 plants. 7. 840.

Page 168. Article 12.—1. 9258. 2. 9291. 3. 8358. 4. 9018. 5. 9738. 6. 9807. 7. 9027. 8. 7647. 9. 10107. 10. 12369. 11. 8601. 12. 9027. 13. 8214. 14. 9324.

Find quotients: 1. 1229. 2. 1152. 3. 2630½. 4. 1825½. 5. 833⅓. 6. 2352½. 7. 3036. 8. 2770.

Page 168. Article 13.—1. 1188, three-cents. 2. 833⅓ yds. 3. $2061. 4. 150 wks. 5. 834 mi. 6. $723. 7. $450. 8. 723, 1005, 106, 2040.

Page 169. Article 14.—1. 6013. 2. 5123. 3. 5341. 4. 3921. 5. 15092. 6. 5001. 7. 5797. 8. 5308. 9. 6333. 10. 5220. 11. 5200. 12. 6310. 13. 7233. 14. 6102. 15. 5013. 16. 6109.

Page 170. Article 15.—1. 7999. 2. 7998. 3. 8757. 4. 7859. 5. 8396. 6. 10139. 7. 4899. 8. 6220. 9. 8538. 10. 12542. 11. 9538. 12. 7039. 13. 3408. 14. 8637. 15. 125.

Page 170. Article 16.—1. 28 c. 2. 3 yds. 3. 12 pks. 4. 6⅔ yds. 5. 7 c. 6. 2½ yds. 7. $3.50. 8. $1.50. 9. 15 da. 10. 4 c. 11. 45 ft. 12. 12 pkgs.

Page 171. Article 18.—1. 3424. 2. 3912. 3. 3872. 4. 3956. 5. 8316. 6. 8392. 7. 7904. 8. 6712.

Quotients: 1. 1697½. 2. 533⅓. 3. 3502½. 4. 3800⅔. 5. 7758½. 6. 16972½. 7. 8508⅓. 8. 9848⅓.

1. 1600 bricks. 2. 5040 pks. 3. 576 sq. in.

Page 172. Article 19.—1. 9280. 2. 13540. 3. 13825. 4. 18845. 5. 17895. 6. 9890. 7. 9740. 8. 5335.

Quotients: 1. 3858. 2. 18961½. 3. 6286⅔. 4. 3721. 5. 8688½. 6. 7604½. 7. 9395⅓. 8. 7460. 9. 10861½. 10. 9492⅔. 11. 17836. 12. 6948⅔.

1. 1179 five-cents. 2. 60 lbs. 3. $1970. 4. ⅓ of 3 times 30: 2 greater. 5. $36.50: 7 bills, $1.50 in change.

Page 173. Article 1.—Express in figures: 1. $967.08. 2. $52000.12. 3. $41011.07. 4. $11100.01.

Products: 1. $4845. 2. $52.20. 3. $225.05. 4. $858.12. 5. $1922.80. 6. $4.25. 7. $3.56. 8. $2.25. 9. $4.50.

Page 174. Article 2.—Quotients: 1. $83.27⅔. 2. $78.05⅓. 3. $233.35⅓. 4. $3350.16⅔. 5. $20190.45. 6. $6400. 7. $5606.52½. 8. $3201.60. 9. $22625.

Page 174. Article 3.—Factors: 2. $36 = 6 \times 6$, 4×9, 2×18, 3×12; $28 = 4 \times 7$, 2×14; $45 = 9 \times 5$, 3×15; $48 = 3 \times 16$, 4×12, 6×8, 2×24; $50 = 2 \times 25$, 5×10. 4. $18 = 2 \times 3 \times 3$; $24 = 2 \times 3 \times 4$; $27 = 3 \times 3 \times 3$; $28 = 2 \times 2 \times 7$; $30 = 2 \times 3 \times 5$; $32 = 2 \times 4 \times 4$; $40 = 2 \times 4 \times 5$; $45 = 3 \times 3 \times 5$.

Page 175. Article 5.—Multiply: 1. 59244. 2. 18054. 3. 60408. 4. 35442. 5. 52074. 6. 71688. 7. 43848. 8. 35382. 9. 96522. 10. 62376. 11. 77748. 12. 70614.

Divide: 1. 5405. 2. 5808⅓. 3. 6306⅓. 4. 7407½. 5. 7807⅕. 6. 8208⅓. 7. 9409½. 8. 9709⅔. 9. 9576. 10. 2861⅔. 11. 3198½. 12. 5238⅔.

Page 176. Article 6.—1. $1.92. 2. 386 lbs. 3. 981 mi. 4. $5.88. 5. 2190 da.

Page 176. Article 7.—1. 4702. 2. 6322. 3. 6013. 4. 70219. 5. 158010. 6. 63223.

Page 177. Article 8.—1. 23789. 2. 13497. 3. 17905. 4. 23907. 5. 30886. 6. 42087. 7. 56708. 8. 67278. 9. 63979. 10. 17598. 11. 44997. 12. 30497. 13. 21989. 14. 44708. 15. 42999. 16. 26879. 17. 23395. 18. 8498.

Page 177. Article 9.—1. $13.63. 2. 9500. 3. 1789. 4. 205 bu. 5. $153.40. 6. 8 strips. 7. $337 lost. 8. $9.54. 9. $779. 10. 1199 mi.

Page 178. Article 10.—1. 14½ c. 2. 45 min. 3. 36 c. 4. ¾ bu. 24 qts. 5. 4 times. 6. 9 horses. 7. 28 c. 8. 41⅛ c. 9. ½. 10. 9 c. 11. 9 yr. 12. 14 lbs., 7 lbs., 1¾ lbs. 13. 15 mi. 14. 72 c. 15. $1.44, $3.36.

Page 180. Article 12.—1. 7223. 2. 5033. 3. 6321. 4. 7210. 5. 49003. 6. 53013. 7. 8131. 8. 6033. 9. 6230. 10. 6833.

Page 180. Article 13.—1. 6500. 2. $7.50. 3. $659. 4. $240. 5. $782.

Page 181. Article 14.—1. 5340. 2. 6344. 3. 7011. 4. 7334. 5. 54033. 6. 50172. 7. 6343. 8. 7031. 9. 8422. 10. 8123.

Page 182.—1. $12.43. 2. 3899 the smaller. 3. 7999. 4. 88 c. 5. $10.53.

Page 182. Article 15.—1. 7100. 2. 5542. 3. 7135. 4. 49245. 5. 42526. 6. 61323.

Page 183.—1. $5117. 2. 500¼ mi. 3. $1734. 4. 30 suits. 5. $209.

Page 183. Article 16.—1. 10 c. 2. 25 pict. 3. 4 books. 4. $1.00. 5. 2 c. 6. 48 sq. ft. 7. $2.50. 8. 5 c. 9. 56 wk., 28 wk. 10. $1.40. 11. 12 ft. 12. 96 cu. in.

Page 185. Article 18.—1. 48636. 2. 40383. 3. 66395. 4. 55342. 5. 42686. 6. 48559. 7. 75383. 8. 83258.

Divide: 1. 2791¼. 2. 2578⅜. 3. 2546⅜. 4. 5664. 5. 2651⅛. 6. 4051⅜. 7. 7851. 8. 1943¾. 9. 3945⅛. 10. 2542⅝. 11. 9715¼. 12. 9609⅜.

Page 185. Article 19.—1. $1.25. 2. $2430. 3. $2.50 loss. 4. $467. 5. $271.

Page 186. Article 20.—1. 6414. 2. 7377. 3. 7443. 4. 5231. 5. 53023. 6. 52124.

Page 186. Article 21.—1. 21986. 2. 11457. 3. 41998. 4. 21789. 5. 30990. 6. 57337. 7. 51543. 8. 41644. 9. 31358. 10. 61675. 11. 42786. 12. 10227. 13. 30988. 14. 15798. 15. 93389. 16. 90796. 17. 13468. 18. 11939.

Page 187.—1. $10.15. 2. $22.95. 3. 156 yrs. 4. 179 lbs. 5. $4750.

Page 188. Article 23.—1. $210 = 2 \times 3 \times 5 \times 7$. 2. $287 = 41 \times 7$. 3. $246 = 2 \times 3 \times 41$. 4. $312 = 2 \times 2 \times 2 \times 3 \times 13$. 5. $390 = 2 \times 3 \times 5 \times 13$. 6. $486 = 2 \times 3 \times 3 \times 3 \times 3 \times 3$. 7. $546 = 2 \times 3 \times 7 \times 13$. 8. $594 = 2 \times 3 \times 3 \times 3 \times 11$. 9. $684 = 2 \times 2 \times 3 \times 3 \times 19$. 10. $615 = 3 \times 5 \times 41$. 11. $714 = 2 \times 3 \times 7 \times 17$. 12. $819 = 3 \times 3 \times 7 \times 13$. 13. $873 = 3 \times 3 \times 97$. 14. $910 = 2 \times 5 \times 7 \times 13$. 15. $987 = 3 \times 7 \times 47$.

Page 189. Article 24.—1. 7333. 2. 6535. 3. 6445. 4. 7213. 5. 53542. 6. 53324.

Page 189. Article 25.—1. 42653. 2. 31786. 3. 11987. 4. 21289. 5. 63909. 6. 41999. 7. 22863. 8. 86886. 9. 78000. 10. 65529. 11. 55476. 12. 51919.

1. $10.80. 2. $5.60. 3. $5.25. 4. $12.75.

Page 190. Article 26.—1. 7466. 2. 6621. 3. 7314. 4. 6630. 5. 62431. 6. 62061. 7. 4402.

Page 190. Article 27.—1. 23668. 2. 22989. 3. 3883. 4. 12635. 5. 4819. 6. 65995. 7. 14886. 8. 61998. 9. 79933.

Page 190. Article 28.—1. 4. 2. 4½ c., 37½ c. 3. ⅕, ⅙, 12 c. 4. $20. 5. $1.50. 6. 27 c. 7. 9 c. 8. 30 min., ½ hr. 9. 54 c., 6 times. 10. ½ doz., $\frac{1}{11}$, 15 c. 11. $1.68. 12. $3.92. 13. 14 bbls. 14. $1.70. 15. $9. 16. 48 lb. 17. ⅔, 30 c. 18. $1.20. 19. ⅚.

Page 192. Article 30.—Multiply: 1. 30792. 2. 68312. 3. 55656. 4. 75072. 5. 51072. 6. 31576. 7. 48752. 8. 59864. 9. 69192. 10. 47784.

Divide: 1. 5180⅘. 2. 6456½. 3. 7057⅛. 4. 7282⅔. 5. 2673⅞. 6. 4879½. 7. 3627⅘. 8. 9857⅞. 9. 7851. 10. 4876⅝.

Page 192. Article 31.—1. 30 c. 2. 8 pails. 3. 15 da. 4. 69 sheep. 5. 5 c. 6. 219 T. 7. 39 bbls.

Page 193. Article 32.—1. 7662. 2. 6546. 3. 8166. 4. 8663. 5. 7364. 6. 51652. 7. 52313.

Page 194. Article 33.—1. 21443. 2. 16265. 3. 31416. 4. 43887. 5. 24652. 6. 7071. 7. 70798. 8. 18756. 9. 15127. 10. 53799. 11. 58236. 12. 70168.

Page 194. Article 34.—1. $8.89. 2. $18.12. 3. $25.28. 4. $9.73. 5. $2400.

Page 195. Article 35.—1. 7777. 2. 57522. 3. 61644. 4. 62142. 5. 8200.

Page 195. Article 36.—1. 7777. 2. 6283. 3. 5566. 4. 57522. 5. 61644. 6. 62142. 7. 8200.

Page 196. Article 37.—Multiply: 1. 75951. 2. 63855. 3. 57546. 4. 72063. 5. 57582. 6. 53712. 7. 57366. 8. 42642. 9. 61506. 10. 44622. 11. 61866. 12. 33822. 13. 77823. 14. 84384. 15. 43533. 16. 81045. 17. 73449. 18. 67167. 19. 57501. 20. 76284. 21. 56682. 22. 24831. 23. 76167. 24. 34866. 25. 57942.

Divide: 1. 1715⅘. 2. 1985⅘. 3. 3040⅘. 4. 8039. 5. 1236⅘. 6. 6156⅘. 7. 1504⅘. 8. 4949⅘. 9. 9825⅞. 10. 8478. 11. 7570⅘. 12. 5284⅘. 13. 4347⅘. 14. 3234⅛. 15. 2709⅘. 16. 7343⅘. 17. 8402⅘. 18. 7136.

19. $5897\frac{7}{8}$. **20.** 4896. **21.** 4581. **22.** $5062\frac{2}{3}$. **23.** $9894\frac{4}{5}$. **24.** $8480\frac{1}{2}$. **25.** $3235\frac{5}{6}$. **26.** 2263. **27.** $2598\frac{7}{8}$. **28.** $3910\frac{5}{8}$. **29.** $6172\frac{7}{9}$. **30.** $4938\frac{2}{3}$.

Page 196. Article 38.—**1.** 10 sq. yds. **2.** $12.96. **3.** 72, 99, 63, 108, 54, 81. **4.** $7.20. **5.** $62.26. **6.** $920.

Page 197. Article 39.—**1.** 78883. **2.** 73512.

Page 197. Article 40.—**1.** 85795. **2.** 47086. **3.** 36057. **4.** 76687. **5.** 59714. **6.** 30437. **7.** 54442. **8.** 9754. **9.** 78756. **10.** 60134. **11.** 7963. **12.** 59658. **13.** 85018. **14.** 8875. **15.** 82355.

Pages 197, 198. Article 41.—**1.** $1.69, $15.21. **2.** 30 dress p. **3.** 76 mo., $6\frac{1}{2}$ yrs. **4.** $7840. **5.** $679. **6.** $37.05. **7.** $51.47 loss. **8.** 10 yds. **9.** $16.12. **10.** $6.30. **11.** $1638.

Page 202. Article 6.—Multiply by 11: **1.** 986953. **2.** 715539. **3.** 9140736. **4.** 4343427. **5.** 4235517. **6.** 6928625. **7.** 8235623. **8.** 5280209.

Divide by 11: **1.** $2347\frac{9}{11}$. **2.** $1858\frac{3}{11}$. **3.** $3439\frac{9}{11}$. **4.** $81782\frac{2}{11}$. **5.** $25778\frac{5}{11}$. **6.** $17273\frac{8}{11}$. **7.** $51618\frac{4}{11}$. **8.** $81859\frac{7}{11}$. **9.** $36730\frac{10}{11}$. **10.** $890950\frac{7}{11}$. **11.** $217712\frac{4}{11}$. **12.** $176225\frac{4}{11}$.

Pages 202, 203, 204. Article 7.—**1.** $24. **2.** 36 bu. **3.** 12 da. **4.** $6. **5.** $64. **6.** $1.40. **7.** $\frac{1}{8}$. **8.** $\frac{1}{8}$. **9.** $0.84. **10.** $2.00. **11.** $8.00, $8.50. **12.** $0.32. **13.** $1.50. **14.** 12 da. **15.** $48. **16.** $\frac{7}{9}$, $\frac{2}{9}$, $63. **17.** 12 squashes.

Page 204. Article 8.—**1.** $835. **2.** 31 p. **3.** 3648. **4.** 4015 da. **5.** $21.90.

Page 205. Article 9.—Products: **1.** 93708. **2.** 113868. **3.** 91416. **4.** 111408. **5.** 358176. **6.** 8754252. **7.** 574032. **8.** 475764. **9.** 7649976. **10.** 4194312. **11.** 814188. **12.** 6828036. **13.** 7417128. **14.** 2288736. **15.** 8740764. **16.** 10264272.

Quotients: **1.** 532. **2.** 264. **3.** $2462\frac{1}{4}$. **4.** $8195\frac{5}{12}$. **5.** $4532\frac{5}{12}$. **6.** 7286. **7.** $4139\frac{5}{12}$. **8.** $6953\frac{1}{6}$. **9.** 80903. **10.** $40331\frac{1}{6}$. **11.** $24864\frac{7}{12}$. **12.** $40313\frac{1}{4}$. **13.** $6553776\frac{3}{4}$. **14.** $925925\frac{1}{12}$. **15.** $8333333\frac{1}{4}$. **16.** $2974085\frac{1}{12}$. **17.** $2079139\frac{3}{8}$. **18.** $7173216\frac{1}{12}$. **19.** $82166704\frac{1}{4}$. **20.** 63182703. **21.** $80640780\frac{1}{4}$. **22.** $54440445\frac{3}{4}$. **23.** $39890833\frac{1}{12}$. **24.** $57728881\frac{1}{12}$.

Page 206. Article 10.—**1.** 224 doz. prs. **2.** $435278. **3.** 420656 tons. **4.** 80 bbls. **5.** 1440 da. **6.** 4400 rev.

Page 207. Article 12.—**1.** $19.68. **2.** $15.57. **3.** $103.20. **4.** $43.36. **5.** $83.06.

Page 208. Article 13.—**1.** 887. **2.** 1177. **3.** 1175. **4.** 1173. **5.** 1176. **6.** 1178868. **7.** 1177579. **8.** 1227742.

Subtract: **1.** 654222. **2.** 79419984. **3.** 827271371. **4.** 80271568. **5.** 66699043. **6.** 789903201.

Page 209. Article 15.—**1.** 1838122. **2.** 3961922. **3.** 1278118. **4.** 1653624. **5.** 1781582. **6.** 5047012. **7.** 7410855. **8.** 7649562. **9.** 6133124. **10.** 2254008. **11.** 1865626. **12.** 6193205. **13.** 978342. **14.** 2430490. **15.** 2722533. **16.** 3117442. **17.** 3478296. **18.** 3427664. **19.** 2045780. **20.** 3472598. **21.** 1504760. **22.** 4048806. **23.** 8109720. **24.** 1644984.

Page 210. Article 16.—Quotients: **1.** 320. **2.** 112. **3.** 223. **4.** 213. **5.** 113. **6.** 213. **7.** $230\frac{1}{3}$. **8.** 560. **9.** $568\frac{1}{3}$. **10.** 320. **11.** $230\frac{1}{3}$. **12.** $223\frac{9}{17}$. **13.** $211\frac{1}{3}$. **14.** 230. **15.** 312. **16.** $352\frac{6}{17}$. **17.** 250. **18.** $242\frac{2}{19}$. **19.** 340. **20.** $420\frac{9}{19}$. **21.** $452\frac{1}{3}\frac{7}{9}$. **22.** $1320\frac{1}{3}$. **23.** $2210\frac{1}{3}$. **24.** 2112.

Pages 210, 211. Article 17.—**1.** $576.44. **2.** $8. **3.** $15.96. **4.** 1728 cu. in. **5.** $346.75. **6.** $1950. **7.** $108. **8.** 1750 sq. ft., $194\frac{4}{9}$ sq. yds.

Page 211. Article 18.—**1.** 604 − 7 rem. **2.** 409. **3.** 403 − 3 rem.

4. 706. **5.** 709 — 4 rem. **6.** 501. **7.** 305 — 47 rem. **8.** 304 — 13 rem. **9.** 709 — 49 rem. **10.** 408 — 1 rem. **11.** 908. **12.** 502 — 16 rem.

Page 212. Article 19. — **1.** 331 A. **2.** $50. **3.** 57216. **4.** $35.70. **5.** 1 o'clock, P. M., 252 mi. NOTE. 8 mi. gain in 1 hr., 56 mi. to be gained; 56 mi. ÷ 8 mi. = 7 (times); 7 hrs. to gain 56 mi.; 36 mi. × 7 = 252 mi.; 6 A. M. + 7 hrs. = 1 P. M. **6.** 610.

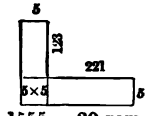
Pages 212, 213. Article 20. — **1.** 50 da. **2.** $\frac{5}{10}$, 36 A. **3.** $0.12. **4.** $14. **5.** 240 pkgs. **6.** $3.80. **7.** $2.35. **8.** $3. **9.** $0.50, $0.40, $0.15, $1.05. **10.** $30. **11.** 1, 4, 9, 16, 25, 36, 49, 64, 81, 100.

Page 214. — Products: **1.** 842060. **2.** 1,420,048. **3.** 2910042. **4.** 3,457,472. **5.** 2856442. **6.** 2363833. **7.** 2,382,362. **8.** 3356878. **9.** 2430462. **10.** 2027712. **11.** 202200. **12.** 4803089. **13.** 1305664. **14.** 2007573. **15.** 1065084. **16.** 4730646. **17.** 4738722. **18.** 2968896.

Pages 214, 215. Article 22. — **1.** $3.48. **2.** 1895 — 1861 = 34 yrs. **3.** $399. **4.** $7.80 gain. **5.** $307.80. **6.** $851.84. **7.** $22.30.

Page 215. Article 23. — Quotients: **1.** 1245. **2.** 1617. **3.** 1303 — 274 rem. **4.** 441 — 479 rem. **5.** 2121. **6.** 1657 — 361 rem. **7.** 1915. **8.** 1627. **9.** 1071 — 55 rem. **10.** 1107 — 488 rem. **11.** 1123. **12.** 220 — 863 rem. **13.** 2432. **14.** 1561. **15.** 1227 — 316 rem. **16.** 2696 — 68 rem. **17.** 589 — 125 rem. **18.** 778 — 123 rem.

Pages 215, 216, 217. Article 24. — **1.** 136.98\frac{4}{5}$. **2.** $375. **3.** 6480. **4.** 120,000 people, 200 votes. **5.** $1.61. **6.** 20 yrs. **7.** 259387166. **8.** 39600 ft. **9.** Yes. 18750 mi. **10.** 6912 cu. in. **11.** 596661. **12.** 8 c. **13.** 368400 watches. **14.** $46,800,000. **15.** 1152 pounds, $345.60. **16.** 375. **17.** 114$\frac{3}{8}$ yds. 2d Ans. 193$\frac{3}{8}$ yds.



Page 218. Article 25. — **1.** 4164 — 144 rem. **2.** 1555 — 20 rem. **3.** 5094 — 91 rem. **4.** 38558 — 127 rem. **5.** 41463 — 18 rem. **6.** 4708 — 145 rem. **7.** 1345. **8.** 10899 — 146 rem. **9.** 3086 — 193 rem. **10.** 26530 — 14 rem. **11.** 15696 — 63 rem. **12.** 3986 — 19 rem. **13.** 5398 — 201 rem. **14.** 1625 — 208 rem. **15.** 3478 — 10 rem. **16.** 7927 — 131 rem. **17.** 60 — 180 rem. **18.** 3224 — 104 rem. **19.** 3692 — 144 rem. **20.** 5033 — 135 rem. **21.** 8060. **22.** 79612 — 112 rem. **23.** 1477 — 285 rem. **24.** 7029 — 430 rem.

Page 218. Article 26. — **1.** $0.64. **2.** 180 ft. **3.** $2.40. **4.** 144 mo. **5.** 6 score. **6.** $\frac{5}{12}$, 40 A., 56 A. **7.** $144. **8.** $1.98. **9.** 80 apples. **10.** 33.33\frac{1}{3}$. **11.** 198 sq. ft., 22 yd. **12.** $12. **13.** $35.20. **14.** 11 da. **15.** $144, $72. **16.** $2. **17.** 11 qts. **18.** $2.40, 900, 900.

Page 220. Article 27. — **1.** $43.20. **2.** 1512 sq. ft., $95.76. **3.** 120 ft. **4.** 15 hrs. 20 min. **5.** 47520 ft. **6.** 1816 to 1830. **7.** 5,346,583 bales.

Page 221. Article 28. — **1.** 203 — 537 rem. **2.** 314 — 79 rem. **3.** 286 — 4899 rem. **4.** 569 — 5758 rem. **5.** 1445 — 3062 rem. **6.** 7279 — 715 rem. **7.** 135 — 1766 rem. **8.** 19885 — 1244 rem. **9.** 325 — 2073 rem. **10.** 368 — 2017 rem. **11.** 503 — 3408 rem. **12.** 2182 — 529 rem. **13.** 260 — 8117 rem. **14.** 1459 — 1764 rem. **15.** 888 — 983 rem. **16.** 4748 — 3537 rem. **17.** 194 — 559 rem. **18.** 884 — 1791 rem. **19.** 520 — 4982 rem. **20.** 430 — 4283 rem. **21.** 798 — 7935 rem. **22.** 354 — 2571 rem. **23.** 121,397 — 370 rem. **24.** 9869 — 386 rem.

Pages 221 to 224. Article 29. — **1.** 133 States, 1005 sq. mi. **2.** 60 lbs. **3.** 1925 mi. **4.** 9396 bu., 1604 bu. rem. **5.** 8067 cu. ft. **6.** $6,187,236,753. **7.** $3025. **8.** 805 bells. **9.** (*a.*) 270 sq. ft. parlor, 195 sq. ft. bedroom, 252 sq. ft. sitting-room, 210 sq. ft. kitchen, 180 sq. ft. dining-room. (*b.*) $110.95 cost. (*c.*) $9.60 cost of molding. **10.** 86 yrs. **11.** 23 payments. **12.** 8993 towns. **13.** 4701$\frac{3}{8}$ loads. **14.** 14 tons. **15.** 16.24\frac{3}{4}$. **16.** 344,030,166. **17.** 17 yrs. **18.** 177$\frac{1}{2}$ loads. **19.** $599,720. **20.** 128792 lbs. **21.** 306000 lbs 153 tons.

Page 225. Article 33.—1. 6. 2. 6. 3. 18. 4. 13. 5. 16. 6. 3. 7. 9. 8. 2. 9. 14. 10. 39. 11. 12. 12. 25. 13. 25. 14. 6. 15. 72. 16. 14. 17. 7. 18. 16. 19. 7. 20. 12. 21. 25.

Page 227. Article 37.—1. 3024. 2. 504. 3. 3744. 4. 288. 5. 504. 6. 594. 7. 540. 8. 2376. 9. 180. 10. 357. 11. 2709. 12. 720. 13. 1,340,480. 14. 17,670,120. 15. 376,216. 16. 7,266,480. 17. 1,825,824. 18. 223344. 19. 2016. 20. 1440. 21. 14112.

Page 228. Article 40.—1. $2\frac{11}{35}$. 2. $2\frac{13}{18}$. 3. $4\frac{1}{5}$. 4. $5\frac{1}{4}$. 5. $5\frac{5}{24}$. 6. $2\frac{2}{7}$. 7. 40. 8. 9. 9. 18.

Page 229. Article 41.—2. 5 pairs. 3. $47\frac{1}{2}$ lbs. 4. $23\frac{1}{3}$ yds. 5. $\$40\frac{1}{2}$. 6. 22 bu. 7. 30 lbs.

Page 232. Article 7.—1 $\frac{272}{11}$. 2. $\frac{471}{13}$. 3. $\frac{672}{15}$. 4. $\frac{1312}{17}$. 5. $\frac{1232}{9}$. 6. $1\frac{475}{16}$. 7. $\frac{1232}{9}$. 8. $\frac{2142}{5}$. 9. $\frac{2555}{6}$. 10. $\frac{1882}{10}$. 11. $\frac{2842}{14}$. 12. $\frac{2504}{60}$. 13. $\frac{5718}{100}$. 14. $\frac{9284}{100}$. 15. $\frac{18603}{200}$. 16. $\frac{28813}{200}$. 17. $\frac{8825}{300}$. 18. $\frac{2718092}{1000}$.

Page 232. Article 8.—1. $\frac{58}{3}$. 2. $\frac{151}{6}$. 3. $\frac{144}{5}$. 4. $\frac{348}{7}$. 5. $\frac{472}{9}$. 6. $\frac{775}{12}$.

Page 233. Article 9.—1. $13\frac{1}{8}$. 2. $7\frac{3}{4}$. 3. 26. 4. 24. 5. $15\frac{9}{20}$. 6 $7\frac{1}{6}$. 7. $7\frac{7}{24}$. 8. $8\frac{4}{5}$. 9. $13\frac{3}{8}$. 10. 30. 11. $20\frac{4}{15}$. 12. $18\frac{2}{45}$. 13. $21\frac{1}{15}$. 14. $33\frac{8}{15}$. 15. $28\frac{4}{7}$. 16. 45.

Page 235. Article 11.—1. $\frac{7}{12}$. 2. $\frac{5}{8}$. 3. $\frac{1}{4}$. 4. $\frac{1}{2}$. 5. $\frac{1}{2}$. 6. $\frac{3}{4}$. 7. $\frac{24}{25}$. 8. $\frac{3}{7}$. 9. $\frac{1}{2}$. 10. $\frac{1}{3}$. 11 $\frac{1}{3}$. 12. $\frac{1}{3}$. 13. $\frac{1}{3}$. 14. $\frac{77}{120}$. 15. $\frac{24}{43}$. 16. $\frac{1}{4}$.

Page 235. Article 13.—1. $\frac{8}{12}$, $\frac{9}{12}$, $\frac{10}{12}$. 2. $\frac{18}{24}$, $\frac{15}{24}$, $\frac{4}{24}$. 3. $\frac{14}{18}$, $\frac{15}{18}$, $\frac{12}{18}$. 4. $\frac{18}{42}$, $\frac{6}{42}$, $\frac{8}{42}$. 5. $\frac{18}{30}$, $\frac{21}{30}$, $\frac{18}{30}$. 6. $\frac{10}{24}$, $\frac{9}{24}$, $\frac{5}{24}$. 7. $\frac{14}{16}$, $\frac{3}{16}$, $\frac{4}{16}$. 8. $\frac{16}{36}$, $\frac{16}{36}$, $\frac{4}{36}$.

Page 236. Article 14.—1. $\frac{105}{140}$, $\frac{84}{140}$, $\frac{20}{140}$. 2. $\frac{6}{24}$, $\frac{4}{24}$, $\frac{15}{24}$. 3. $\frac{18}{27}$, $\frac{24}{27}$, $\frac{27}{27}$. 4. $\frac{54}{126}$, $\frac{70}{126}$, $\frac{9}{126}$. 5. $\frac{24}{30}$, $\frac{27}{30}$, $\frac{2}{30}$. 6. $\frac{108}{252}$, $\frac{105}{252}$, $\frac{252}{252}$. 7. $\frac{12}{72}$, $\frac{24}{72}$, $\frac{72}{72}$. 8. $\frac{3402}{85125}$, $\frac{3825}{85125}$, $\frac{17010}{85125}$.

Page 236. Article 15.—1. $\frac{20}{21}$. 2. $\frac{7}{8}$. 3. $1\frac{5}{24}$. 4. $1\frac{1}{24}$. 5. $\frac{13}{18}$. 6. $1\frac{1}{12}$. 7. $1\frac{1}{24}$. 8. $\frac{23}{30}$. 9. $\frac{93}{97}$. 10. $1\frac{17}{18}$. 11. $1\frac{1}{36}$. 12. $1\frac{41}{56}$.

Page 237. Article 16.—1. $2\frac{1}{5}$. 2. $1\frac{43}{60}$. 3. $2\frac{17}{120}$. 4. $2\frac{11}{12}$. 5. $2\frac{1}{30}$. 6. $1\frac{13}{20}$. 7. $1\frac{13}{45}$. 8. $1\frac{121}{180}$. 9. $175\frac{5}{8}$. 10. $72\frac{11}{12}$. 11. $181\frac{1}{7}$. 12. $50\frac{9}{40}$.

Page 238. Article 17.—1. $\frac{5}{12}$. 2. $\frac{1}{6}$. 3. $\frac{1}{20}$. 4. $\frac{1}{12}$. 5. $\frac{19}{36}$. 6. $\frac{18}{35}$. 7. $\frac{5}{12}$. 8. $\frac{3}{10}$. 9. $\frac{17}{56}$. 10. $\frac{1}{21}$. 11. $\frac{5}{14}$. 12. $\frac{11}{21}$. 13. 0. 14. 0. 15. $\frac{1}{36}$.

Page 238. Article 18.—1. $3\frac{1}{20}$. 2. $5\frac{3}{4}$. 3. $17\frac{1}{12}$. 4. $15\frac{19}{56}$. 5. $10\frac{4}{21}$. 6. $7\frac{1}{12}$. 7. $4\frac{19}{21}$. 8. $7\frac{13}{21}$. 9. $21\frac{1}{15}$.

Page 238. Article 19.—1. $\frac{5}{24}$. 2. $\frac{1}{6}$. 3. $7\frac{1}{8}$ yds. 4. $\$5\frac{7}{12}$. 5. $\$1\frac{17}{20}$.

Page 239. Article 20.—1. $3\frac{1}{2}$. 2. $4\frac{1}{2}$. 3. $3\frac{1}{2}$. 4. $5\frac{3}{4}$. 5. $6\frac{3}{4}$. 6. $3\frac{1}{7}$. 7. $3\frac{3}{14}$. 8. $1\frac{1}{5}$. 9. $27\frac{3}{4}$. 10. $50\frac{3}{4}$. 11. 69. 12 $36\frac{1}{8}$.

Page 239. Article 21.—1. 16. 2. 16. 3. 30. 4. 15. 5. $6\frac{1}{3}$. 6. 21. 7. 24. 8. 48. 9. 36.

Page 240. Article 23.—1. $\frac{6}{8}$. 2. $\frac{15}{18}$. 3. $\frac{4}{15}$. 4. $1\frac{1}{3}$. 5. $2\frac{1}{3}$. 6. $\frac{18}{35}$. 7. $\frac{4}{5}$. 8. $\frac{10}{21}$. 9. $3\frac{1}{3}$. 10. $6\frac{1}{4}$. 11. $\frac{3}{14}$. 12. $\frac{20}{27}$. 13. $\frac{5}{24}$. 14. $15\frac{5}{8}$. 15. $19\frac{1}{2}$. 16. $\frac{7}{8}$. 17. $\frac{27}{32}$. 18. $\frac{7}{150}$. 19. $39\frac{1}{16}$. 20. $75\frac{1}{2}$.

Page 241. Article 24.—1. $\frac{1}{2}$ a. 2. $\$\frac{7}{10}$. 3. $\$1\frac{1}{28}$. 4. $\$\frac{3}{4}$. 5. $\$\frac{7}{24}$. 6. \$0.10$\frac{3}{8}$. 7. $\frac{9}{40}$. 8. 59$\frac{3}{8}$ m.

Page 242. Article 26.—1. $\frac{5}{42}$. 2. $\frac{7}{72}$. 3. $\frac{6}{35}$. 4. $\frac{4}{45}$. 5 $\frac{1}{12}$. 6. $\frac{4}{39}$. 7. $\frac{2}{15}$. 8. $\frac{4}{21}$. 9. $\frac{19}{90}$. 10. $3\frac{1}{3}$. 11. $4\frac{2}{5}$. 12. $4\frac{7}{15}$. 13. $8\frac{1}{16}$. 14 $3\frac{2}{21}$. 15. $6\frac{1}{12}$. 16. $5\frac{3}{20}$. 17. $9\frac{7}{20}$. 18. $3\frac{1}{12}$. 19. $11\frac{2}{9}$. 20. $9\frac{11}{21}$. 21. $3\frac{23}{35}$.

Page 243. Article 27.—1. 27. 2. $33\frac{1}{3}$. 3. $28\frac{4}{7}$. 4. 60. 5. $68\frac{4}{7}$. 6. $113\frac{3}{8}$. 7. 126. 8. 63. 9. $8\frac{4}{13}$. 10. $2\frac{2}{5}$. 11. $13\frac{1}{3}$. 12. $5\frac{1}{11}$.

Page 244. Article 29. — 1. $1\frac{1}{7}$. 2. $1\frac{1}{3}$. 3. $1\frac{1}{5}$. 4. $1\frac{1}{7}$. 5. $\frac{5}{8}$. 6. $\frac{14}{15}$. 7. $1\frac{9}{10}$. 8. 13. 9. $5\frac{1}{5}$. 10. $3\frac{1}{4}$. 11. $8\frac{1}{2}$. 12. 21.

Page 245. Article 30. — 1. $\frac{5}{12}$. 2. $\frac{1}{16}$. 3. 14 b. 4. $\frac{5}{11}$. 5. $5.40. 6. 99. 7. 17 p. 8. 38 pkgs. 9. $5. 10. $13\frac{1}{2}$ yds. 11. 8 jars. 12. $\frac{1}{4}$ of 3 lbs.; $\frac{3}{4}$ lbs. 13. $\frac{13}{15}$. 14. 90 ℓ. 15. 10 ℓ. 16. $1\frac{2}{5}$ mi. 17. 35 qrs. 18. $3\frac{1}{8}$. 19. $\frac{21}{32}$ ft.; $7\frac{7}{8}$ in. 20. 40 ¢. 21. $1\frac{1}{4}$ doz. 22. 18 yrs. 23. $1.20. 24. $2\frac{1}{2}$ times. 25. $13\frac{1}{8}$; $21\frac{3}{8}$; $\frac{7}{8}$. 26. $\frac{4}{5}$. 27. $68\frac{1}{4}$ ℓ. 28. $82\frac{1}{2}$ ft. 29. 8 prs. 30. $33\frac{1}{3}$ da.

Page 247. Article 31. — 1. $137\frac{5}{12}$ yds. 2. $5\frac{7}{10}$. 3. $73\frac{7}{10}$. 4. $\frac{7}{25}$. 5. $427\frac{3}{7}$ ms. 6. $52\frac{7}{8}$ oz. 7. $584\frac{2}{3}$. 8. $194\frac{2}{3}$. 9. $128\frac{1}{4}$. 10. $131\frac{1}{12}$ a. 11. $307\frac{79}{120}$ bu. 12. $3801. 13. $3480. 14. $10\frac{4}{5}$ tons. 15. $3\frac{8}{10}$. 16. $9\frac{1}{2}$ lbs. 17. $4\frac{1}{2}$. 18. $\frac{3}{49}$. 19. $\frac{57}{62}$. 20. $60\frac{1}{2}$. 21. 8 wks.; $118. 22. $\frac{1}{3}$ still own, $3000. 23. $125, 36 times. 24. 44 yr.; 18 yr.; 15 yr.; 12 yr.; 6 yr.; 143 yr.

Page 254. Article 13. — 1. $\frac{9}{10}$. 2. $\frac{9}{100}$. 3. $\frac{7}{20}$. 4. $\frac{3}{20}$. 5. $\frac{8}{200}$. 6. $\frac{11}{40}$. 7. $\frac{17}{400}$. 8. $\frac{8}{200}$. 9. $\frac{9}{1000}$. 10. $\frac{127}{250}$. 11. $\frac{1}{80}$. 12. $5\frac{9}{25}$. 13. $15\frac{9}{250}$. 14. $18\frac{1}{200}$. 15. $16\frac{4}{25}$. 16. $\frac{6}{625}$. 17. $90\frac{9}{1000}$. 18. $60\frac{4}{25}$. 19. $19\frac{181}{625}$. 20. $180\frac{1}{1250}$.

Page 255. Article 14. — 1. .375. 2. 30.75. 3. .25. 4. 62.5. 5. .8. 6. .075. 7. .0625. 8. .875. 9. .26. 10. .46$\frac{2}{3}$. 11. .45. 12. 33.33$\frac{1}{3}$. 13. .66$\frac{2}{3}$. 14. .064. 15. 12.08. 16. .41$\frac{2}{3}$. 17. 16.66$\frac{2}{3}$. 18. .0178$\frac{4}{7}$.

Page 255. Article 15. — 1. 2.515. 2. 3150.098. 3. 233.4668. 4. 15038.0359. 5. 234.93 yds. 6. 70.176. 7. 455.144366.

Page 256. Article 16. — 1. 104.39. 2. 22.0755. 3. 900.135. 4. .72. 5. .8991. 6. 19.011. 7. 628.2616. 8. .069993. 9. .81. 10. 83.11. 11. 105.3324.

Page 257. Article 18. — 1. .18142. 2. .08316. 3. 1205. 4. 12.05. 5. 3.1552. 6. 1869.6. 7. 246.048. 8. 24.6048. 9. 1150.56. 10. 11505.6. 11. .000081. 12. .072.

Page 258. Article 21. — 1. 230. 2. 2300. 3. 4.4. 4. 440. 5. 257.428$\frac{4}{7}$. 6. 2430. 7. 24.3. 8. 1000. 9. 86.137$\frac{23}{341}$. 10. 10,000. 11. .0046$\frac{24}{25}$. 12. 1.561$\frac{1}{2}$. 13. 32,825. 14. 25,742.857$\frac{1}{7}$. 15. 3.375$\frac{25}{81}$.

Page 258. Article 22. — 1. 8000.01353. 2. 182.15 bbls. 3. .91375. 4. 38.625 gals. 5. $960. 6. 56.5 gals. 7. 626$\frac{3}{17}$ A. 8. $1.675. 9. .0078125. 10. 3.67644. 11. $123.5. 12. 38.4375 yds. 13. $29.2685. 14. 1000 bottles. 15. 253.65.

Page 261. Article 25. — 1. $25.005. 2. $9.011. 3. $17.17. 4. $7.017. 5. 12.075. 6. $111.011. 7. $1001.001. 8. 2000.025.

Page 262. Article 26. — 1. 34000 m. 2. 25,250 m. 3. 535 m. 4. 980 m. 5. 24655 m. 6. 9125 m. 7. 672 m. 8. 100,750 m. 9. 18,964 m. 10. 750 m. 11. 375 m. 12. 1,600,620 m. 13. 13,145 m. 14. 755. 15. 8625 m. 16. 46,024 m.

Page 263. Article 27. — 1. $12. 2. $120. 3. $290.18. 4. $1.60. 5. 1.20. 6. 2.50. 7. $25.

Page 263. Article 28. — 1. $58.30. 2. $4168.64. 3. $55.025. 4. 396.68. 5. 300.90.

Page 264. Article 30. — 1. $865.731. 2. $0.505. 3. 20-dollar gold piece and 5-dol. piece. 4. $26.644. 5. $4.125. 6. Two 20-dol. gold pieces. 7. 163.44 yds. 8. $7080.48. 9. 70 lbs. 10. 356 da. 11. 46 wks. 12 $0.375.

Page 266. Bills. 13. $91.54. 14. 97.26. 15. $103.215.

Page 269. Article 5. — 1. 561 pt. 2. 504 qt. 3. 790 pt. 4. 60 pt.

Page 269. Article 6. — 1. 12 bu. 3 pk. 1 pt.; $5\frac{1}{4}$ bu. 2. 10 bu. 2 pk. 5 qt.; 5 pk. 7 qt. 1 pt. 3. 3 bu. 3 pk. 5 qt.; 5 pk. 3 qt. 1 pt.

Page 270. Article 7.—1. 120 pt. 576 gi. 2. 559 gi.; 64 gi. 3. 11 gal. 3 qt.; 5 gal. 3 qt. 1 pt. 4. 10 qt. 1 pt. 2 gi.; 3 gal. 2 gi. 5. 804 gi.; 152 pt.

Page 271. Article 8.—1. 6000 lbs.; 9600 oz. 2. 11977 oz.; 288000 oz. 3. 27 T. 1 cwt. 45 lbs.; 230½ lbs. 4. 364 cwt. 25 lbs.; 1 T. 5. 11236 lb.

Page 272. Article 10.—1. 292 pkgs. 2. $15.12. 3. 385 bu. 3 pk. 1 qt. 4. $35. 5. 17½ da.

Page 272. Article 11.—1. 198 ft.; 258.5 ft. 2. 27072 in.; 5760 rd. 3. 1410 rd.; 320760 in. 4. 158400 in.; 3468 in.; 1224 in.; 4718.4 in. 5. 3 mi. 9 rd. 3 yd. 2½ ft.; 1 mi.; 10 mi. 40 rd.; 4 mi.; 9 mi. 7. 240 rd. 8. ¼ mi. 9. 1961 times. 10. 24 rd. 4 ft. 11. 93.5 ft. 12. 8 min.

Page 274. Article 14.—1. 38115 sq. ft. 2. 2880 sq. rds. 3. 536.405 sq. ft. 4. 4,014,489,600 sq. in. 5. 30497 sq. ft. 6. 9 A.; 27 A. 7. 18 sq. yd. 8. 40 sq. rd. 9. 1 sq. mi. 10. 9 sq. mi.

Page 275. Article 15.—1. 6 sq. ft. 2. 108 sq. in.; 120 sq. in. 3. 1080 sq. in. 4. 180 sq. ft. 5. 12 ft. 6. 1 A. 2 sq. rd. 7. $5664.

Page 278. Article 19.—1. 46656 cu. in.; 31104 cu. in. 2. 20736 cu. in. 3. 1687½ cu. ft. 4. 2048 cu. ft.; 1312 cu. ft. 5. 12 cu. ft. 6. 20 cu. ft. 7. 432000 cu. in. 8. 861264 cu. in. 9. 9 cords; 50 cords. 10. 120 cu. ft. 11. 128 cu. ft. 12. 155520 cu. in. 13. 2700 cu. ft. 14. 1536 cu. ft. 15. 2½ cords. 16. $22.68. 17. 12 cu. ft. 18. $57.656+

Page 280. Article 21.—1. 43200 sec.; 7200 min. 2. 736800 sec. 3. 41760 min. 4. 1 da.; 1 da. 5. 6 yrs.; 9 yrs. 9 da. 8 hrs. 16 min.

Page 281. Article 23.—1. 75 bu. 3 pk. 4 qt. 2. 76 mi. 268 rd. 3 yd. 3. 40 wk. 5 da. 11 hr. 24 min. 50 sec. 4. 69 gal. 3 qt. 1 pt.

Page 281. Article 24.—1. 11 gal. 3 gi. 2. 19 cwt. 98 lb. 11 oz. 3. 10 wk. 2 da. 20 hr. 9 min. 5. 15 yr. 5 mo. 27 da.

Page 282. Article 25.—1. 450 mi. 276 rd. 4 yd. 2 ft. 3 in. 2. 69 gal. 3 qt. 3. 49 T. 5 cwt. 16 lb. 8 oz. 4. 130 cu. yds. 4 cu. ft. 63 cu. in. 5. 84 sq. yds. 1 sq. ft. 142 sq. in. 6. 57 yrs. 9 mos. 7. 58 bu. 2 pk. 8. 110 A. 40 sq. rd. 9. 38 yr. 2 mo.

Page 283. Article 26.—1. 8 bu. 1 pk. 7⅝ qts. 2. 5 gal. 1¾ pts. 3. 1 cwt. 82 lb. 9 oz. 4. 4 hr. 36 min. 22 sec. 5. 2 cu. yd. 26 cu. ft. 1¾ cu. in. 6. 3 sq. yd. 1 sq. ft. 125½ sq. in. 7. 5 rd. 4 yd. 10 in. 8. 12 bottles, 2 pt. rem. 9. 13 sacks.

Page 284. Article 27.—3. 156¼ sq. ft. 4. 140 sq. rds. 5. 28⅛ A. 6. 3466⅔ sq. yd. 7. 51⅓ sq. yd. 8. 51⅓ sq. yds. 10. 196⅝ sq. yd. 11. 88⅝ sq. yd. 12. 20 steps. 14. 57¾ yd. 15. 51⅝ yd. 16. 8½ yd. 17. 6.875 cords. 18. 40¼ cords. 19. 1296 boxes. 20. 990 boards. 21. 200 trees. 22. 225 loads.

Page 290. Article 3.—2. 24, 32, 36, 10. 3. 16, 24, 38⅜, 44⅘. 4. 24.5, 56.7, 90. 5. $82.03. 6. $39.048, $62.50. 7. 12 da. 8. 275 bu. 9. 500 bu. 10. $0.15125, $0.15. 11. $40. 12. $30. 13. 12 absent; 188 present. 14. 100 A.

Page 291. Article 4.—2. 33⅓ %, 20%, 14⅔%. 3. 11⅓ %, 33⅓ %. 4. 16⅔ %, 16⅔ %. 5. 7⅓%. 6. 4½ %, 6 %, 20 %, 25 %. 7. 25 %, 25 %. 8. 33⅓ %. 9. 75 %. 10. 133⅓ %.

Page 292. Article 5.—2. 800, 400, 600. 3. 200, 300, 400. 4. 200, 160, 400. 5. 80, 200, 50. 6. 100, 10, 16⅔. 7. 640. 8. $944. 9. $900. 10. $1500. 11. $10. 12. 200 bu. 13. 150 A. 14. $3000. 15. $60. 16. 5 ft. 17. 4 ft. 18. 160 rd.

Pages 293 and 294. Article 3.—3. $12, $24. 4. $10. 5. $30. 6. $60. 7. $30. 8. $3. 9. $18.

Page 294. Article 7.—2. $48.15, $56.175. 3. $68.83⅓, $110.13⅓. 4. $12.274, $8.182½. 5. $222.282. 6. $243.11½. 7. $711.96¾. 8. $1337.66⅔.

Page 295. Article 8.—1. 12, 4, 4. 2. 4, 4. 3. 36, 12. 4. 20 %. 5. $6. 6. 50 %. 7. 12. 8. 12 ¢. 9. 33⅓ %. 10. 5 ft. 3.6 in. 11. 25 ¢. 12. 75 %. 13. 5 %. 14. 10 %. 15. $1.37½. 16. 9$\frac{1}{11}$ %. 17. $16. 18. 20 %, $\frac{4}{5}$. 19. 19$\frac{1}{21}$. 20. 30, 400, 300. 21. 10, 100, 200. 22. 1½ times, 150 %. 23. $7.00. 24. 150 ft. 25. 92.16 ft. 26. 72 ¢, 6 ¢. 27. $0.06. 28. 8 yr., 2 yr. 29. 3 yr. 30. $10.$\frac{00}{11}$.

Page 298.—1 5 bu. 2. 300, 57.6. 3. $12, $\frac{1}{11}$. 4. 21 bbls. 5. 28 men. 6. 62½ da. 7. $2.52.

Page 299.—1. 1$\frac{5}{16}$ yds. 2. $\$\frac{5}{6}$. 3. 3½ cs. 4. $\frac{7}{20}$ lb. 5. $\frac{5}{8}$ apples. 6. 4 lamps—40 ¢ rem. 7. 7 children. 8. 2$\frac{5}{8}$ boxes. 9. 4 yds. 10. 720 books. 11. 6¼ mo.

Page 300.—1. 645. 2. 11.072. 3. 4186.316. 4. $4000. 5. $187.50. 6. $34 167. 7. 1458.48. 8. $16000. 9. 735.399$\frac{851}{1251}$. 10. 1285.474$\frac{78}{253}$.

Page 301.—1. 54 children. 2. 240 tiles. 3. 1518¾ bricks. 4. 16 times. 5. 864 blocks. 6. 2066$\frac{2}{77}$ gal. 7. 293½ loads.

1. Papering and Plastering.—1. 47½ sq. yds. 2. 24$\frac{19}{27}$ sq. yd.; 83$\frac{19}{27}$ sq. yd. 3. 72$\frac{7}{9}$ sq. yd. 5. 30⅛ rolls.

Page 303.—2. 16¾ ft.; 9½ ft. 3. 67½ ft. 4. 20¼ ft. 5. 266$\frac{2}{3}$ ft. 6. 8⅛ ft.

Page 304.—1. $0.80. 2. $0.60. 3. $1.00. 4. $1.50. 5. 12½ %. 6. 40 %. 7. 20 %. 8. 25 %. 9. $2½. 10. 91⅔ %.

Page 305.—11. 20%; 16$\frac{2}{3}$%. 12. $250; $125; $75; $50. 13. $125. 14. 20 %. 15. 32 %; 44 %; 50 %. 16. 50%.

Page 306.—1. $960. 2. $423. 3. $99.45. 4. $148.40. 5. $61.20; $65.48.

Page 307.—6. $41.25. 7. $46 67. 8. $73.50. 9. $11.20. 10. $2.07. 11. 16 cts. 12. 81 cts. 13. $318.92. 14. $20. 15. $18.75. 16. $45. 17. $35. 18. $61.43. 19. $76.56. 20. $156.80. 21. $9.19. 22. $58.84.